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AN EXPLORATION OF THE INFLUENCE OF INSTRUCTIONAL TECHNOLOGIES ON FACULTY MOTIVATION AND TEACHING INNOVATION ON A RESEARCH CAMPUS

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AN EXPLORATION OF THE INFLUENCE OF INSTRUCTIONAL TECHNOLOGIES ON FACULTY MOTIVATION AND TEACHING INNOVATION ON A RESEARCH CAMPUS.

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Abstract

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The purpose of this study was to explore how the introduction of instructional technologies has influenced the motivational attitudes of higher education faculty at research-oriented institutions with respect to their teaching responsibilities. This was a qualitative study using case-study methodology and involved multiple (4) purposefully-selected faculty members who were studied at an in-depth level within the teaching context of their institution. Research questions that were addressed included: (1) What are the relative roles of intrinsic and extrinsic motivational factors with respect to a faculty member's investment in new skills related to the application of instructional technologies? (2) In what ways do faculty members approach the introduction of new instructional technologies into their overall set of professional responsibilities (research and publication, service, teaching, etc.)? (3) Do demographic factors (gender, age, etc.) influence faculty investment in the use of new instructional technologies? (4) To what extent do career-stage factors (pre/post tenure, retirement, etc.) influence faculty investment in the use of new instructional technologies? (5) In what ways do campus and departmental cultures influence motivational behavior with respect to the use of instructional technologies by individual faculty? The findings of this study reaffirmed previous studies, but also offer new insights into how faculty members balance the expanded use of increasingly complex instructional technologies within their professional goals and responsibilities. This study can be helpful to higher education leadership in the development of programs and reward structures that enhance the overall teaching and

learning focus of faculty members at a time when instructional technologies are becoming more central to the business of higher education both nationally and globally.

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Chapter 1: Introduction to the Study

> Most faculty members did not seek careers in the academy because of a strong love of technology or a propensity for adapting to rapid change; yet they now find themselves facing not only the inexorable advance of technology into their personal and professional lives but also the presence in their classrooms of technology-savvy Net Generation students, leading them to feel a bit like the character Valentine Michael Smith in Robert Heinlein's 1961 novel Stranger in a Strange Land. (Hartman, Dziuban, & Brophy-Ellison, 2007, p. 62)

Faculty members at 21st century U.S. institutions of higher education function in an increasingly complex work environment that is oftentimes ambiguous and sometimes presents competing goals and priorities with teaching being only one of many tasks performed on a daily basis (Bess, 1997; Blackburn & Lawrence, 1995; McGee & Diaz, 2007; Schuster & Finkelstein, 2006). The goal of this study was to explore the role of teaching through the lens of the motivational issues that influence faculty members' likelihood to invest time in their teaching and classroom responsibilities with respect to the use of technology. This was a qualitative study in which I collected and analyzed data using multiple case study methodology. Through the analysis of the data, I have defined themes and cultural experiences that help address the question of how campus faculty members perceive the relative value of accomplishment in this one facet of their job responsibilities. In addition to analyzing and reporting the data collected in this study, new research questions will be posed that may be useful in future research studies of a similar or parallel nature.

U.S. Undergraduate Education in the 21st Century

As we begin the second decade of the 21st century, the U.S. higher education system maintains a strong leadership role in terms of quality of research and the scale of educational output with over 18 million students enrolled in post-secondary institutions in 2006 (Allen & Seaman, 2007). Although scholarship and enrollments continue to expand, the educational mission of American higher education has come under increased scrutiny. Retention and graduation rates, as key measures of educational output, are stagnant or dropping (AACU, 2002; Spellings Commission, 2006). It is apparent that the issue of degrading or worsening undergraduate performance has become a matter of national concern and debate (AACU, 2002; Feller, 2006; Spellings Commission, 2006).

Yet the stakes have never been higher than they are now for post secondary education and the future of the U.S. economy and standard of living. Recent decades have seen an accelerated shift of the global economy from one based on agriculture and manufacturing to one where intellectual capacity defines a society's ability to succeed in competition with other nations (Friedman, 2005). The U.S. undergraduate system is integral to America's capacity to compete effectively on such an international basis.

While concern about this at a national level has resulted in targeted resource investment on the U.S. K-12 system with the goal of improving outcomes (AACU, 2002; NCLB, 2002), until recently the higher education component in the total U.S. educational supply-chain has been left to function in a relatively isolated and autonomous state with modest external oversight (Spellings Commission, 2006). However, in this age of ever-increasing costs, greater demands for quantity and quality of educational output, and heightened government scrutiny, the potential benefit of re-examining and improving the

undergraduate mission has never been more significant (Bok, 2003; Pavel, 2000; Ruch, 2001).

Although this may seem like a new issue, the debate about the educational mission and direction of American higher education, particularly with respect to a growing research emphasis, has raged for decades if not centuries. In recent years, formal calls for a rejuvenated undergraduate emphasis have come internally from such relevant and respected sources as the Carnegie Foundation for the Advancement of Teaching (Carnegie Foundation, 2007), leading higher education scholars (Boyer, 1990; Fairweather, 1996; Huber, 2004; Huber & Hutchings, 2005; Shulman, 2004) and the academy itself (Katz, 2006). While such calls have been politely and sometimes enthusiastically received, dramatic efforts to retool and improve the undergraduate learning experience in America have struggled in an environment where research effort, grant production, and scholarly publication production are treated by most institutions as the real prize for faculty achievement (Blackburn & Lawrence, 1995; Boyer, 1987; Boyer, 1990; Fairweather & Beach, 2002; Rice, 1991; Shulman, 2004). Research-intensive campuses are thus particularly challenged in encouraging greater faculty interest and effort in their teaching roles and the current expansion of the application of instructional technologies in the classroom space has only served to amplify the challenge.

The Classroom has Changed

Since the late 20th century, the classroom has evolved. Where for instructors it was once an uncomplicated and solitary experience of lecturing and assessment involving a generally well-prepared and homogeneous population of 18-24-year-old students from

middle-class families, it has now become a multi-faceted exercise in which the 'traditional' student is the exception and not the rule (Levine, 2005; Oblinger & Rush, 1997; Prensky, 2001). Further change in the classroom has come from the influence of technology on the learning styles of students (Brown & Adler, 2008; McGee & Diaz, 2007; Prensky, 2001; Rhodes, 2006) as well as on the skills required to function effectively as a teacher in this new environment (Bess, 1998). Even the nature of the classroom itself has become less clear as video-conferencing, social networking tools, online course delivery and other communication tools have redefined how, when, and where a faculty member performs the act of teaching. For most faculty members, adapting to these evolving teaching expectations requires new skills.

Given the increasing influence and complexity of instructional technologies, understanding how faculty members adapt to a technological revolution in the classroom has caught the interest of researchers, policy-makers and foundations alike. Starting in the late 20th century, the influence of instructional technology in education emerged as a topic of significant interest leading to the creation of a number of new journals and foundations dedicated to the exploration of this new field of inquiry. Examples include Technology Horizons in Education (T.H.E. Journal, 2008) and the Sloan-C Foundation which promotes research and understanding on distance learning issues (Sloan-C, 2008). EDUCAUSE, as a major provider of scholarly work on technology in higher education, has supported and published a significant body of scholarly research on many aspects of the influence of technology on higher education instruction. Research on technology and education has grown as a source of scholarly inquiry in many of the traditional higher education journals as well (EDUCAUSE, 2008).

As in any other industry, leadership within the academy plays an active role in providing developmental opportunities for its workers and, in particular for the faculty population which is a very critical component of the school's workforce in the delivery of teaching. In the business of higher education, campus administrations have a vested interest in providing an overall working environment that maximizes all employee output (i.e., productivity) which often includes developmental opportunities and incentive programs for the faculty population. But, unlike most industries, the choice of participation by faculty in these activities and programs is largely one of self-selection, not compulsion (Blackburn & Lawrence, 1995; Palmer, 1998; Schuster & Finkelstein, 2006). Therefore, the challenge of maximizing participation (not to mention effectiveness) in these offerings is magnified with faculty at U.S. colleges and universities when contrasted to their corporate counterparts where organizational culture is less impacted by 'academic freedom.'

Thus, campus leadership finds itself currently in a position where it is being expected to improve educational output at a time when teaching proficiency frequently requires the adoption of new skills with technology by its primary teaching resource—the faculty population. And in a culture where self-selection is the driving force among faculty, aligning program purpose with individual motivation is critical if new faculty development programs focused on teaching are to achieve broad-based success. Therefore, understanding faculty motivation with respect to their teaching roles should be a desired objective for higher education leadership.

Starting in the mid-twentieth century, worker motivation became a focus of attention and scholarly study in the areas of human psychology, organizational

leadership, and human resource management (Maslow, 1943, 1954; Herzberg, 1959, 1962). A greater understanding of the role of money, age, and intrinsic/extrinsic factors in worker motivation emerged from those efforts. Higher education faculty, as a significant subset of the overall U.S. white collar workforce, has also been studied extensively from an overall motivational and productivity standpoint (Blackburn & Lawrence, 1995; Bess, 1977; Tuckman, 1976). The advent of distance education and other instructional technologies in higher education has stimulated additional interest in faculty motivation vis-à-vis the development of new skills related to using these new tools (Beggs, 2000; Betts; 1998; Hartman, Dziuban, & Brophy-Ellison; 2007; McGee & Diaz, 2007; Mitchell, 1999; Moser, 2007; Olcott & Wright, 1995; Parker, 2003; Schifter, 2000; Shea; 2007; Smith, 1996; Wolcott & Betts, 1999).

The Challenge for Faculty to Change

Higher education faculty members in the U.S. perform their jobs within a highly complex set of roles and responsibilities with competing demands on their time. Both quantitative and qualitative studies on U.S. faculty members have looked at the full spectrum of their professional roles with particular emphasis on the competing nature of their teaching and research responsibilities.

A good starting point in understanding faculty motivation and their willingness to adopt new technologies and improve their teaching skills is their acceptance of the need to improve or change behavior at all. If faculty members do not perceive a need to change, then motivating them to develop new skills is all the more difficult. There are indications that faculty generally do not think they need to improve in their teaching roles. For example, in a broad study of the faculty working environment, Blackburn and

Lawrence (1995) noted that over half of all college faculty members believe they are in the top 10% with respect to quality of teaching with over 90% believing they are above average. Based on this mathematical impossibility, it becomes easy to assume that most faculty members do not believe they are in need of developmental assistance on their teaching skills when most of them think they are doing a fine job currently. Why seek to improve when you are among the best already?

The Impact of Technology

The notion that technology-supported course delivery is impacting the U.S. faculty population in a disruptive way is not an abstract one. Rather, we are in a period of rapid expansion of the use of distance education and other technologically-enhanced means to reach new student populations and respond to changing life-style and demographic patterns. For example, between 2002 and 2006, the total number of students in the U.S. taking at least one fully online course more than doubled from 1.6 million to over 3.4 million (Allen & Seaman, 2007). Considered another way, by the fall of 2006 approximately one out of every five students in the U.S. post-secondary system was enrolled in at least one fully online course. The general trend towards greater dependency on technology-enhanced course delivery continues upward. Developing confidence and expertise in functioning effectively in this new environment within a broad cross section of the faculty population is clearly a growing workforce need in U.S. higher education.

The relevance of this dependency is felt at the most senior level of information technology leadership, with the support of online technologies and the training of faculty to effectively use them as two of the top 10 issues most relevant to U.S. higher education chief information officers in 2007 (Bell, Zastrocky, Harris & Lowendahl, 2006; Camp &

DeBlois, 2007). Further, by 2007, 93% of all U.S. higher education institutions were employing course management technologies to support the instructional needs of their campuses (Hawkins & Rudy, 2008). Online course delivery has thus caught the attention of institutional leadership.

In addition to traditional online course management systems, the early 21st century has also seen an explosion of other new technologies that are being applied for instructional purposes. Examples of these new tools include wikis, podcasting, blogs, desktop video-conferencing, webinar tools for real-time collaboration, and interactive clicker technologies. Many faculty members have been willing and able to successfully adapt these new technologies and associated instructional techniques into their teaching work. For many others, however, exploring and mastering these new technologies has not yet become a priority in their professional lives. Instead, they have continued to rely on their existing pedagogical skills and techniques with their students (Hartman et al., 2007).

Understanding the motivational context of these two differing groups of faculty should be of significant relevance in the 21st century where the confluence of instructional technologies and increased emphasis on the outputs of the undergraduate system are impacting all institutions in the U.S. This issue is further complicated at research-intensive schools where the competing expectation of scholarly output degrades the likelihood faculty members will set aside sufficient time to develop new skills in other areas—including teaching.

Purpose and Scope of the Study

The purpose of this study was to directly explore the motivational conditions that influence higher education faculty members' activities with respect to their professional

teaching roles by examining factors that impact a faculty member's likelihood to expand his or her teaching skills and innovate in the classroom as represented by their higher level use of instructional technologies. This was a qualitative study that utilized multiple case-study methodology in which selected faculty members at research-intensive institutions were observed at an in-depth level within their teaching context across a substantial period of time in an academic year.

Assumptions

The goals of this study are based on the assumption that understanding faculty motivations and other teaching-related behavior patterns can be successfully explored and explained through the use of in-depth case-study analysis. It is further assumed that the themes and descriptions derived from this study will have relevance in a larger context for campus administrators as well as applicability in future studies. To that end, this effort will be grounded in the literature for design, analysis, and representation to ensure structural rigor with respect to qualitative research and case study methodology.

Research Questions

The broad purpose of this study was to explore faculty motivational issues with respect to innovation in their teaching and the extended influence of technology on their teaching activities. Within this larger purpose there were several specific research questions I intended to address which are as follows. (1) What are the relative roles of intrinsic (personal desire, inquisitiveness, etc.) and extrinsic (compensation, administrative support, etc.) motivational factors with respect to a faculty member's investment in new skills related to the application of instructional technologies? (2) In what ways do faculty members approach the introduction of new instructional

technologies into their overall set of professional responsibilities (research and publication, service, teaching, etc.)? (3) Do demographic factors (gender, age, etc.) influence faculty investment in the use of new instructional technologies? (4) To what extent do career-stage factors (pre/post tenure, retirement, etc.) influence faculty investment in the use of new instructional technologies? (5) Do campus or departmental cultures influence motivational behavior with respect to the use of instructional technologies by individual faculty?

Policy Implications

Answering such questions is relevant to higher education in order to help campus leaders build professional development programs that are more effective at enhancing instructional skills and improving the overall teaching and learning experience for students. Further, as the expected use of instructional technology by instructors becomes more commonplace on campuses, understanding how faculty members become motivated to pursue skills related to their use will grow in relevance as well. Additional understanding through such explorations should assist campus leadership in developing more effective programs and reward structures. At a higher level, by developing a stronger understanding of how faculty members become motivated to improve their teaching skills, U.S. higher education can better respond to a growing national demand for increased levels of accountability and improved learning outcomes for graduating students that is a matter of increasing importance in U.S. society.

Chapter 2: Literature Review

The exploration of faculty motivation with respect to technology and their teaching roles is a story that is grounded in two broad areas of previous study: (1) the higher education culture and the professional reward structure that motivates faculty members to perform in different ways, and (2) the injection of technology as a disruptive event in the higher education classroom starting in the latter part of the 20th century.

In recent decades, a great deal has been written about the fact that teaching has become a more globally-oriented profession with a resulting increase in external pressures to reinvigorate the teaching and learning experience to improve student outcomes (Bess, 1997, 1998; Blackburn & Lawrence, 1995; Bloland, 1999; Bok, 2003; Foster, 2001; Pavel, 2000; Schuster & Finkelstein, 2006; Spellings Commission, 2006). While much has been written calling for change, the U.S. higher education system has remained largely centered around a professional reward system that is skewed toward research and publication output—particularly at four year institutions (Blackburn & Lawrence, 1995; Boyer, 1987; Colbeck, Cabrera, & Marine, 2002; Colbeck, 2005; Fairweather, 1996).

This reward system, with its strong emphasis on research, has reduced investment in the teaching role on the part of individual faculty. A number of studies going back several decades has examined the disincentive phenomenon in which faculty at four-year research-intensive institutions generally do not view effort in teaching as a reward towards professional advancement, but instead see instructional effort as poorly invested time (Bess, 1977; Blackburn & Lawrence, 1995; Cravener, 1999; Schuster & Finkelstein, 2006). As described by a faculty dean in Votruba's (1978) examination of faculty reward

systems “in this university, service and teaching are rewarded about the same, which is to say that neither is rewarded very much.” Back in 1977 Bess pointed out that “the overall campus environment for most faculty is to ‘stay within the borders’ with little (or no) reward for creative teaching” (Bess, 1977).

As a result, the reward in teaching effort as seen by many faculty members is to figure out how to spend less time at it through increased efficiency thus freeing up time to invest in the more professionally beneficial work of research and publication (Blackburn & Lawrence, 1995; Schuster & Finkelstein, 2006; Trimmer, 2006). This complex and conflicting work environment that competes for a faculty member’s attention is clearly of interest to many researchers in higher education and contributes heavily to the literature.

These competing priorities eventually take a toll on faculty members’ attitudes and behavior that can challenge their overall motivational context. Bess (1998) described the potentially negative influence of this conflicting environment well when he averred that “asking workers to perform too large a variety of roles for which they are either incompetent or psychologically ill-disposed will result in reduced motivation, effort, creativity, and productivity” (p. 5).

In response to the continued reward for research in the face of renewed expectations for teaching outcomes, scholars and policy-makers have called for an increased emphasis on the professional value of teaching by higher education faculty (Astin, Keup, & Lindholm, 2002; Bess, 1997; Boyer, 1990, Shulman, 2004) including the option of treating the science of teaching and learning as a form of academic scholarship on a par with traditional discipline-based research from a tenure and promotion

perspective (Boyer, 1990; Huber, 2004; Huber & Hutchings, 2005; O'Meara & Rice, 1991).

The Motivated Subgroup

In spite of the various disincentives to teaching, many higher education faculty members at four-year research-intensive institutions still invest significant time and creativity in their instructional activities. The added effort of incorporating technology into their teaching activities by many faculty members has put even greater emphasis on exploring how they become motivated to do what they do in the classroom. Identifying and understanding this subset of the faculty population has been of interest to many researchers (Beggs, 2000; Betts; 1998; Frost & Teodorescu, 2001; Hartman, Dziuban & Brophy-Ellison, 2007; Lincoln, 2000; McGee & Diaz, 2007; Mitchell, 1999; Moser, 2007; Olcott & Wright, 1995; Parker, 2003; Schifter, 2000; Shea; 2007; Smith, 1996; Wolcott & Betts, 1999). These studies have ranged from very large scale quantitative analyses of national databases to focused qualitative studies involving single programs on individual campuses. While it is apparent that there are many motivated faculty when it comes to teaching with technology, not much effort has gone into trying to uncover and explain predictive factors and other understandings of their exceptional behavior.

Out of this body of research, a number of factors have emerged as potentially significant influencers of faculty motivation. These factors fall into two broad categories: external (or extrinsic) factors and internal (or intrinsic) factors. Extrinsic factors include such things as money in the form of compensation, career level in the form of pre/post tenure status, availability of additional resources to support teaching and learning, and administrative support (both real and perceived) for the teaching and learning mission of

the campus. Additionally, demographic factors such as age and gender are treated as external for the purpose of this study. Intrinsic factors are those that reside within the personal attitude of the individual faculty member and are less easy to perceive or measure through traditional observational means.

Exploration of the external factors lends itself to relatively traditional quantitative and broad-survey methodologies and, as a result, much has been learned about their relative roles as influencers of faculty motivation in teaching. On the other hand, intrinsic factors being driven from within the individual personalities of motivated faculty are more subtle and thus are more difficult to expose, explore, and explain. This greater level of difficulty, however, has not prevented researchers from gaining useful insights into those internal factors that compel certain faculty members to put more into their teaching work than would generally be predicted based on the prevailing reward systems in higher education as it exists today.

The next section of this literature study presents what I have been able to uncover with respect to both broad categories of motivational influences: extrinsic and intrinsic. I will start with the extrinsic factors and then cover the intrinsic ones.

Extrinsic: Money and Compensation

When exploring worker motivation, money is frequently of consideration. In our modern economy, workers are almost universally compensated in a common currency and not in bartered services or goods of ill-defined value. At a generalized human psychology level the role of money as a motivator has been studied across broad classes of workers and includes the work of such scholars as Herzberg (1959, 1962) and Maslow (1943). The general conclusion is that money functions as a motivational tool only to the

extent that it allows workers to address their basic living needs. Once those basic needs are met, money falls down the list of significant motivators. The following paragraphs present what is known about higher education faculty regarding the role of money.

Money in the form of direct compensation is certainly a necessary tool to compel the vast majority of faculty to show up for work at a college or university. The occasional retiree will continue to volunteer his or her time to teach classes, but such behavior is the exception and not the rule. An important question to the purpose of this study is to understand the extent to which money functions as a motivator in getting faculty members to invest in teaching. Going well back into the 20th century, a number of researchers have explored the general question of money and its influence on faculty motivation across all of their professional activities. Consistent with what is known with other groups of white collar workers, increased compensation has yet to be identified as a clear and consistent influencer of faculty behavior, as noted by Colbeck et al. (2002) and Fogg (2006) and going back to Tuckman's in-depth study (1976) of faculty and compensation. Additional work in the current context of increased work related to the growing dependency on instructional technologies has come to similar results regarding the role of compensation and faculty motivation (Parker, 2003; Schifter, 2000).

However, when money is considered in the form of resources to facilitate teaching innovation (grants, additional facilities and personnel, access to technology, etc.) it can function as a temporary motivator (Colbeck, Cabrera, & Marine, 2002; Moser, 2007; OECD, 2005; Olcott & Wright, 1995; Powers, 2000)—or at least remove the de-motivational impact of a resource shortage in the face of increased needs. Overall, money

may be a general influencer of faculty motivation or it may not be. Additional research will be required in that area.

In summary, it appears that higher education faculty members behave much like other groups of white collar workers when it comes to financial compensation and its motivational influence on behavior in the workplace. That is: money generally acts as a disincentive when there is too little, but ceases to significantly influence behavior once basic material needs are met.

Extrinsic: Tenure and Promotion

Tenure is one of the most sought-after goals of higher education faculty members. Teaching capability is one of the many factors to be evaluated when a junior faculty member is considered for advancement. At four-year institutions with a research orientation, research and publication is widely perceived to be more relevant to achieving tenure than is the teaching capacity of an individual faculty member. A significant body of research has given empirical support to this perceived deference to research over teaching with good overviews provided by Bess (1997), Blackburn and Lawrence (1995), and Shuster and Finkelstein (2006). In a study regarding the influence of the tenure process on faculty motivation (Patriquin et al., 2003), it was found that the post-tenure process of ongoing professional review does little to truly motivate, but serves only to "weed out the deadwood" (p. 289).

Thus in the context of tenure and promotion, teaching capability is viewed only as something not to fail at as opposed to something at which one should excel. This is somewhat analogous to the role of compensation where the greatest impact as an

extrinsic factor is largely on the negative (or de-motivational) side and not as a strong predictor of positive motivational behavior.

Extrinsic: Administrative Support

The support of the campus administration—both real and perceived—with respect to teaching activities has the potential to influence faculty behavior. Two broad areas of campus support for teaching as seen by faculty are: (1) tangible in the form of available resources including facilities, support staff, etc. and (2) intangible in how faculty view administrative attitude via such things as professional recognition, career advancement, or campus-wide programs supporting teaching activities. Investigations into the role of campus support as an instructional motivator have found both of these categories to be relevant. For example, the availability of substantive resources has been seen as a strong motivator for faculty activity as well as a de-motivator when they are lacking (Agnobiahor, 2006; Colbeck et al., 2002; Cravener, 1999; Blackburn & Lawrence, 1995).

Regarding the role of the less-tangible administrative support factor, indications are that the extent to which faculty invest in their teaching is concretely impacted by their perception of how leadership supports the teaching and learning mission of their campuses (Frost & Jean, 2003; Frost & Teodorescu, 2001; Lindholm, 2003; Spencer, White, Peterson, and Cameron, 1989). In general, the more they perceive administrative support for teaching the more likely they are to invest additional time and effort in their instructional roles.

Faculty reaction to administrative support can also be influenced by how programs are packaged and delivered. For example, in a study of three large research university programs that invested heavily in the teaching mission of their respective

campuses, Fairweather and Beach (2002) found that the impact of such programs was much more positive when implemented and managed at the departmental level while they resulted in little behavioral change when directed at the campus-level. Much like compensation, the overall impact of the administration appears to be transient and inconsistent, reflecting a general disconnection in perception between what the administration thinks motivates faculty and what the faculty members actually report as motivational (Schifter, 2000; Wolcott & Betts, 1999).

Extrinsic: The Role of Gender

A number of studies have explored the relationship between gender and faculty motivation and teaching with varying conclusions. For example, Spencer et al. (1989) noted that female faculty members were generally more motivated and satisfied with their work than their male counterparts while Farmer (1987) was unable to identify a significant gender variance. On the other hand, in a quantitative study Shea (2007) found that female faculty members were more likely to participate in distance education than male faculty. The design of this study allows for additional exploration into the unclear role of gender in instructional motivation.

Extrinsic: Employment status

Employment status in the form of part-time adjunct versus full-time tenured is another identifiable characteristic of the faculty population that has been examined as a potential factor influencing teaching motivation. The general conclusion is that part-time faculty members tend to be more motivated towards their instructional work (Antony & Valadez, 2002; Blackburn & Lawrence, 1995; Shea, 2007) than their full-time colleagues. This is not surprising given that these instructors generally self-select into the

role of instructor and tend to teach a large number of undergraduate students. Such information carries significant potential to campus administrators during a time of increased dependency on using contingent faculty to teach the many online courses that are appearing in course catalogs (Shea, 2007). While the role of employment status is of general interest to the study of faculty motivation, this particular study is not designed to address it directly.

Extrinsic: Age

A number of studies have explored the role of age as a predictor of faculty motivation. Like gender, a clear direction on the role of age has not emerged (Blackburn & Lawrence, 1995; Shea, 2007), particularly with the compounding influence of tenure pursuit which tends to come in the early years of a faculty member's career and potentially decreasing motivation to invest in other activities including teaching skills. There is some indication that older faculty may put more into their teaching (Colbeck et al., 2002; Shea, 2007), which may be related to the general fact that career advancement is less of an issue for senior faculty members.

The Added Influence of Instructional Technology

The purpose of this study is not to re-examine faculty motivation towards teaching at a general level, but instead to explore the role of instructional technology as a specific influencer of faculty motivation. While the previous paragraphs provided a general context for faculty motivation across multiple factors, this section narrows the picture to see what is known about the emerging influence of technology on faculty attitude and behavior toward teaching.

While there are many ways in which faculty use technology in their teaching, much of the work on understanding faculty's effort to adopt instructional technologies has centered on the specific application of distance education and mostly in an online (web-based) environment. The reason for this specific area of interest is not explicitly declared across the body of research, but the logic behind the prominence of this one facet of instructional technology (distance education) as an area of interest is most likely pragmatic in nature. Campuses nationwide are building and expanding distance education programs at a rapid pace to keep up with market demands (Allen & Seaman, 2007; Bussey, 2008) and they are struggling to develop an adequate supply of prepared, motivated, and confident faculty to teach in an online environment. Thus, the value of such research is elevated and the source of data is rich.

While this study is not limited to distance education as a form of instructional technology, because of the extensive use of many different instructional technologies to teach online, it is reasonable to treat the results of these distance education studies as representative across a broader technology landscape. As a result, this portion of the literature work for my study draws heavily on what is known about the influence of distance education on faculty motivation.

The Information Age Comes to Education

The influence of the post-industrial information age on education has been similar to many other industries wherein tension exists between those who embrace the change and those who see mostly risk. Early in the adoption cycle of instructional technologies, some in higher education were rather fearful of technology and its potential to both dehumanize the learning experience for students as well as put faculty jobs at risk

(Beggs, 2000; Novek, 1996). Terms from the 19th century industrial-age revolution such as luddite reappeared to describe those faculty members who were most resistant to technological change. Concurrent to the inclusion of technology in teaching has been a significant shift in the national student body to one that is more diverse demographically as well as culturally adept relative to the influence of technology on communication and behavior (Oblinger & Rush, 1997; Prensky, 2001). This widening gap between students and faculty on both skills and attitude toward technology has exposed an even greater need to explore what motivates instructors to have a positive attitude about learning to use these technologies in their teaching (McGee & Diaz, 2007).

As will be seen in the following section, much of the work done to understand faculty's behavior with technology has paralleled other work on faculty motivation in general with a number of surprisingly similar conclusions. This consistency of results helps to give us a stronger picture of how faculty are motivated with respect to their investment in teaching overall as well as clarifies what may be important for campuses to consider as they put greater emphasis on more faculty adopting the use of instructional technologies more broadly.

Intrinsic Motivation in Charge

In my review of the literature, I have observed a theme that identifies intrinsic motivation as the most powerful factor influencing faculty investment in teaching and their use of instructional technology. Numerous studies presented results consistent with this point (Beggs, 2000; Betts, 1998; Colbeck et al., 2002, Mitchell, 1999; Parker, 2003; Schifter, 2000; Wolcott & Betts, 1999). The role of intrinsic motivation as the primary driver for faculty is similar between studies that included instructional technologies as

well as those that examined teaching activities in general. There is additional evidence suggesting that those who put more into their teaching are intrinsically motivated in general, while those who are less motivated respond better to extrinsic inducements (Wolcott & Betts, 1999). Put differently, those faculty who put more into their teaching—including technology—tend to do so for intrinsic reasons and are largely unaffected by external efforts of the administration to persuade them with money, resources, or temporary programs. On the other hand, those faculty members who are less likely to innovate and use technology in their teaching may try out new things, but only in response to external inducements, which as we have already learned tend to only provide temporary behavioral change.

Drawn from a number of qualitative and quantitative studies that reported this intrinsic trend (Beggs, 2000; Betts, 1998; Schifter, 2000; Shea, 2007), tables E1 & E2 (Appendix E) summarize the top motivational and de-motivational factors that faculty reported as influencing their investment in teaching and technology.

Summary of What is Known

The significant volume of literature on faculty motivation indicates that there is great interest in developing a better understanding of where faculty members invest effort and why. Out of the varied mix of possible predictors, a consistent theme of intrinsic motivation has emerged regarding faculty effort in their teaching. Numerous studies have shown that faculty members who are most likely to spend time on their teaching—regardless of the delivery means—are intrinsically motivated in their efforts (Altbach, Berdahl, & Gumport, 1999; Bess, 1977; Betts, 1998; Mitchell, 1999; Parker, 2003; Schifter, 2000; Shea, 2007; Spencer et al., 1989; Wolcott & Betts, 1999). The research

paints a picture in which those faculty members who find teaching and improved student outcomes rewarding as an end in itself tend to put more effort into the art—and science—of teaching. Extrinsic factors such as pay, recognition, and tangible resources may have a temporary impact on teaching effort with some faculty members, but do not appear to do so in a way that is easily scalable or permanent. The introduction of technology into the equation has not fundamentally changed that conclusion, only reinforced it. Qualitative and quantitative studies alike point to this same observation.

If one thinks about higher education faculty as an identifiable subset of the larger white-collar workforce in the U. S., the notion that intrinsic motivation is a primary driver of behavior and productivity is not surprising. This is consistent with the observations of early research by Herzberg (1959, 1962) and Maslow (1943, 1954) in the general understanding of worker motivation in post-industrial economies that showed that external (or extrinsic) factors diminish as a source of motivation once basic human needs are met in the form of pay, food, housing, etc. From that point forward, self-directed, intrinsic motivational factors take over. Thus, for those faculty members who enjoy teaching, who want to reach out to new student populations, who want to indulge their natural curiosity with new tools and techniques, and have their basic material needs in order, the internal drive takes over. The literature is consistent and clear to this point.

But, this phenomenon does not appear to be generalized across all faculty members and at all points in their careers. External factors such as age, competition with research, tenure advancement, availability of resources, and perceived campus attitude toward teaching appear to influence faculty teaching motivation in both positive and negative ways. It may be that the majority of higher education faculty members at

research-oriented campuses have an internally-driven desire to teach that is always there and these external factors serve only to complicate the picture. The current literature is unclear on that point. What does seem consistent is that some distinct subset of faculty on research-oriented campuses is naturally drawn to the teaching profession and is willing to put exceptional effort into expanding their skills regardless of the external context. By all descriptions, they behave in an intrinsically-motivated manner with respect to their teaching including the internal drive related to adopting new technology skills.

The purpose of this study is to better understand those particular faculty members who fall into this intrinsically-motivated category. As a qualitative study its purpose will not be to prove or disprove previous studies or to generalize results, but rather to provide a richer understanding of the context in which intrinsically-motivated faculty members ply their trade of teaching. In particular, I hope to expand our understanding of previously-identified factors such as age, gender, pre/post tenure, and administrative perceptions through the depth of multiple case-study analysis.

Chapter 3: Research Methodology

Overview of Project Methods

This study explored faculty motivations in their teaching roles and the increasing demands to develop new skills related to teaching, including an greater emphasis on the use of instructional technologies. I used qualitative case study methodology (Stake, 1995; Yin, 2003; Yin, 2009) and focused on multiple faculty members who have exhibited extensive use of instructional technologies in their teaching activities. These cases were purposefully selected based on clearly defined selection criteria (see the case selection rubric in Appendix B). Through this case study methodology, I collected and analyzed a wide variety of data. From these multiple data sources, I developed a comprehensive description of the instructional experiences of these faculty members. I placed special emphasis on collecting data that was informative relative to their motivational issues with technology—the central goal of this study.

Choice of Qualitative Methodology

Qualitative exploration of external outcomes, behaviors, and time investment by faculty in their professional roles has been used as an effective means of exploring motivation in their roles as both researchers and teachers (Frost & Teodorescu, 2001; Frost & Jean, 2003; Frost, Jean, Teodorescu & Brown, 2004; Moser, 2007; Parker, 2003). The multi-faceted professional responsibilities of a faculty member in the 21st century are highly complex and influenced by many variables, both internal and external. Qualitative research methodology is also frequently used to study such complex social environments; particularly when they involve human behavior and social interactions (Creswell, 1998; Denzin & Lincoln, 1994; Merriam, 1998). As Creswell (1998)

describes, qualitative research methodology is a "process of understanding that explore[s] a human or social problem in which the researcher builds a holistic picture, analyzes words, reports detailed views of informants and conducts the study in a natural setting" (p. 15). The complex world of a teaching faculty member on a research campus and the motivational factors that influence his or her choices of activity is well-suited to being explored in this way.

A number of general studies—both qualitative and quantitative—of productivity, performance, and motivation of faculty in their various roles have been published (see Chapter 2). However, the more specific topic that I pursued in this study—that of faculty motivation with respect to teaching and the confluence of new technologies on their level of innovation and motivation—is less well understood. I approached this challenge using case study methodology. Investigating the experiences of faculty members as creative and engaged instructors in their natural environment required collecting data across multiple dimensions including social networks (people), context (place), and time. Therefore, case study methodology with its emphasis on exploring complex experiences, yet contained within defined boundaries, was appropriate for a study of this varied nature (Creswell, 1998; Denzin & Lincoln, 1994; Merriam, 1998; Miles & Huberman, 1994; Stake, 1995; Yin 2003; Yin, 2009).

As I presented in the Literature Review (Chapter 2), a number of studies have indicated that faculty members are motivated by both intrinsic and extrinsic factors. The literature points to intrinsic factors as the more powerful of the two influences (APLU-Sloan, 2009b; Bess, 1997; Blackburn & Lawrence, 1995; McGee & Diaz, 2007; Schuster & Finkelstein, 2006). Some theories drawn from this work have identified a number of

significant factors that are classified as intrinsic, with both intellectual curiosity about technology and addressing student needs among these identified intrinsic factors. (See Table E1 in Appendix E for a complete list of these reported factors.) However, the existing literature does not offer a deeper understanding of how these intrinsic factors come to exist within certain individuals or how they may be influenced by other external factors such as age or gender. My goal in this study was to build on these previous studies through in-depth observation and exploration of purposefully-selected faculty members who have exhibited similar behavior.

In the balance of this chapter I will define, discuss, and defend the choice of qualitative research and the use of case study methodology as the most appropriate means of exploring faculty motivation. I will cover the following topics: how and why case-study methodology is suitable for this study, how I will attend to issues of study rigor, techniques I employed to collect, manage, and analyze the data collected, and how I reported the results of this analysis. Overall, my intention in this section is to paint a picture of a research approach that was thorough, well-structured, and worth pursuing. In the end, the methods I employed must be shown to have both addressed my research questions and also provided confidence in the results.

Theoretical Framework

In any research project, the investigator makes many choices. What direction will the research take? What methods will be employed? How will the results be analyzed and presented? Among these many choices, the researcher must also choose a theoretical framework that governs the way in which he or she approaches scientific inquiry at a fundamental level. In this section, I will give a generalized process by which a researcher

can develop the theoretical framework for any project and then I will provide the specifics of what framework I adopted for this particular study.

Arriving at a methodology to employ in a research effort should not be the result of an arbitrary or capricious decision. Rather, it should be the result of a logical progression of decisions that follow an established and supported pathway (Cresswell, 1998; Denzin & Lincoln, 1994). A good example process of this that is well-suited to the qualitative researcher is supplied by Crotty (2004), who describes a multi-step approach in which the researcher starts by first selecting an epistemology that leads to developing a theoretical perspective. The selected theoretical perspective then defines a set of choices in general methodology that results in the selection of specific research methods that are well-suited to the chosen methodology. This approach is not only beautiful in its logic and efficiency, but it also gives the researcher a greater confidence and peace of mind in the appropriateness of the specific method he or she ultimately selects. Investigators of all persuasions are well aware of the need to be prepared to defend their results—qualitative researchers are no exception to this rule. Anything that assists the investigator in the defense of his or her results is a worthwhile tool and Crotty's model is useful to that purpose.

Epistemology and Theoretical Perspective

In its simplest form, the definition of epistemology is the philosophical theory of knowledge that one adopts at a personal level. All researchers approach their work from an epistemological perspective and this requires developing a personal paradigm—or set of basic beliefs—that frames their research. This need to establish an epistemological framework is particularly important in qualitative research (Guba & Lincoln, 1994) and is

derived from the notion that qualitative data are ultimately created through the interaction of the observer and the observed with the characteristics of the researcher becoming intimately interwoven into the fabric of the study (Denzin & Lincoln, 1994).

Social constructionism (Crotty, 2004) is an appropriate epistemological position for me to take as it resonates well with the way I established knowledge in this study. Consistent with Crotty's definition of social constructionism, the case participants and I jointly developed the meaning and knowledge as they engaged in their efforts to develop new course activities. Unlike positivism, the traditional perspective of quantitative research, the knowledge that evolved from this study is not absolute and inherent in the participants. Rather, the meaning in this study was constructed by the researcher using his perceptions, personal subjectivities, and interactions with the participants' experiences.

As a theoretical framework, interpretivism seemed appropriate since my primary goal in this study was to explore and describe the phenomenon of the developmental experiences shared by the faculty participants (Crotty, 2004). In contrast to a full-blown phenomenological study where the goal is to exhaustively analyze the data to uncover the essence of the participants' experiences, this study of multiple individual faculty members was limited to only exposing themes and patterns and seeking a better understanding of the participants' motivations. My goal also was to generate new questions and to add clarity to existing pictures that are incomplete.

Why Case Study?

As I presented previously in this document, the study of faculty motivation and the use of technology in their teaching represents a relatively new area of exploration with a great many unknowns. Through the literature review, I had concluded that my

study area lacked well-documented models or widely-accepted theories. I therefore needed to select a study methodology that would be helpful in such a lightly understood area.

Among the variety of methodologies available to the qualitative researcher, case study methodology stood out as a suitable approach for an early-stage study such as mine that seeks to provide greater depth of understanding to a poorly understood topic. As described by Flyvbjerg (2006), a case study is a detailed examination of a single example of a class of phenomena, and although it cannot provide reliable information about the broader class, it can be quite useful in the preliminary stages of an investigation by providing foundational knowledge. This new foundational knowledge can be further explored and more clearly understood in subsequent studies using a larger number of cases.

The case study approach is applicable in a wide variety of circumstances and is well-suited at providing rich and descriptive information about topics in specific settings—including time and place (Creswell, 1998; Eisenhardt, 1989; Flyvberg, 2006; Merriam, 1998; Scholz & Tietje, 2002; Stake, 1995; Yin, 2003, 2009). And as Yin (2003) noted, case study as a strategy is particularly useful when the investigator has little control over the events being studied and when the focus is on some contemporary phenomenon involving real-life situations.

After considering these general characteristics of case study methodology, I was confident in its general appropriateness for conducting further explorations of the motivation of faculty with respect to their use of instructional technologies. Studying them in their natural settings as active instructors on a university campus also made

sense. But my goals in this study went beyond simple description of observed phenomena. I had a further interest in providing scientifically useful explanations of what I observed and generating baseline theory that could serve as a foundation for follow-on studies.

Again, although there are many options available to the qualitative researcher, the case study approach is particularly a useful tool for the researcher who is interested in both generating—and testing—new theory (Eisenhardt, 1989; Yin, 2003). In particular, Eisenhardt (1989) provides an excellent approach for development of new theories using case study research approaches. While case study is not the only option a qualitative researcher has to choose from for exploring human phenomena as well as developing scientifically rigorous theories about them, it was suitable for this study. Extending the case study model to a multi-case approach gave me the opportunity to explore the demographic variables (age, gender, employment status, etc.) embedded in my research questions. As well-established experts on the case-study method, both Yin (2009) and Stake (1995) point out the strength of multi-case analysis in such circumstances.

Timeline of Data Collection

Given the expected complexity and scope of this study, sufficient time was required for all phases to be completed accurately and thoroughly. The time-line of the data collection phase of the project spanned multiple semesters and two academic years. This span of time was necessary to allow for inclusion of the many activities experienced by a faculty member associated with course design, skills acquisition, and instructional delivery. See Appendix F for a recap of the time-line used for planning and executing this study.

Selection of Cases Used

As I noted in the introduction to this chapter, the data sources for this study were chosen from a research-oriented campus and included faculty members who had exhibited positive motivation in their teaching combined with high levels of technology use. The four case participants I included were selected via purposeful sampling using a rubric specifically designed to meet the central theme of this study. The selection process also ensured that the participant group included a sufficiently heterogeneous representation of the study factors to provide a rich source of information, including experiences and teaching artifacts. Refer to Appendix B for a detailed discussion of the case selection process I employed to select the four participants. See also Table 1 (Summary of Selected Case Participants by Study Factors) for a comparison of the participants chosen, including how their individual profiles were representative of the factors and questions to be explored in this study.

It is important to clarify that my selection of these four faculty participants was based only on their relative level of instructional innovation and use of technology. I was not concerned with the quality of their teaching or any measurement of their absolute expertise with technology; nor was I looking for evidence of good or bad teaching. Rather, I was focusing only on the motivational factors that caused them to pursue technology at a higher level than their peers.

Table 1

Summary of Selected Case Participants by Study Factors

Factor	Case 1	Case 2	Case 3	Case 4
Academic Department	Marketing	Engineering	English	Economics
Career-Level	Pre-Tenure	Post-Tenure (<1 yr)	Post-Tenure (<5 yrs)	Post-Tenure (25+ yrs)
Age	<40	<40	40-60	60+
Gender	M	F	F	M

Data Collection

When studying faculty, it is important to note that the issues that influence their motivations are embedded in the vagaries and emotions of their complex working environment, which may often include competing and sometimes contradictory motivations and rewards (Blackburn & Lawrence, 1995; Schuster & Finkelstein, 2006). Understanding the factors that influence faculty behavior in such a complex environment is non-trivial. The goal of my data collection phase was therefore to gather with sufficient breadth and depth to develop a thorough picture of their activities with technology. In keeping with an interpretivist framework, my goal was primarily to expose themes and patterns rather than to perform an exhaustive end-point analysis as would be the goal of a phenomenological or grounded theory study. This consideration affected the process of coding and analysis that I used.

The data that I gathered fell into the basic categories recommended by most qualitative methodology scholars such as Creswell (1998), Yin (2003, 2009), and Merriam (1998) and included: (1) interviews, (2) observations, and (3) documents and

other artifacts both in tangible and digital form. As much as possible, the data were gathered in the natural context of where the faculty members planned and conducted their teaching activities. In qualitative research "fieldwork is carried out by immersing oneself into a collective way of life for the purpose of gaining a firsthand knowledge about a major facet of it." (Shaffir & Stebbins, 1991, p. 5) Such natural locations included the classroom, departmental areas, and their private offices. Yin (2003, 2009) recommends the case study approach when the context has a strong influence on the phenomenon itself, which I believe to be true in the case of faculty and their teaching environments. At the very least, I would have an opportunity to see first-hand how they used technology in the classroom. The categories of data I collected are summarized in Table 2 (Summary of Data Collected).

Scope of Individual Cases

One design consideration in case study methodology is scope. In other words, what defines the case as a unit of study? In some case studies, the borders of each individual case are well-defined, such as an academic year at a particular school or a community that has participated in a government program over a defined period of time. In this study, the borders of the case are the faculty participants themselves as unique individuals with their own behavior patterns, attitudes, and motivational drivers related to their teaching activities. Thus, there were not absolute requirements to limit data collection within a specified time-frame (e.g., academic year) or event (e.g., specific technology project undertaken). This gave me additional latitude in the time and format of my data collection activities.

Table 2

Summary of Data Collected

	Data Category	Formats & Additional Notes
1	First person data collected from the four case-study participants	Audio interviews (MP3 format) Email dialog Self-completed survey instruments and other materials completed by participants
2	Interviews with department/program chairs	Audio Interviews (MP3 format)
3	Classroom observations	Three (3) classroom observations of each One (1) event in Spring 2009, Two (2) in Fall 2009 For one participant, the fall observations were in online sections only due to teaching assignments at that time.
4	Teaching artifacts and technology examples	Syllabi, screen captures, specific examples of technologies used, etc.
5	Researcher notes	Handwritten notes and other analytical produced by the researcher as a by-product of data collection and analysis.

Ultimately, the entire data collection process occurred over a 12 month period spanning four terms in two different academic years. During that time, I also collected a variety of teaching artifacts including classroom observations in live class settings. The majority of the audio interviews data were collected at a place of their choosing—which was most commonly their on-campus office.

Interviews

Interview data were the largest single source of primary data collected in this study. Sources of interview data included the individual case-study faculty members themselves and their departmental chairs. All of the interviews were pre-planned around a specific research goal and involved a structured script designed to collect data relevant to that goal. Within the interviews themselves, I employed multiple styles of questions including semi-structured (open-ended "seed" questions) and unstructured (free-form dialog). See Appendix C ("Data Source 1: Interview Data") for a detailed discussion of the design and execution of data collection related to interviews with the participants and their departmental leaders. I recorded these interviews with a hand-held digital recorder which I was able to translate into MP3 format for storage and transcription.

Classroom Observations

Observing my case study participants in live classroom settings proved to be a good source of data. During these direct observations, I captured additional rich data in the form of field notes that included context-specific information such as who was in the classroom, what I observed, and when the data were collected. Consistent with accepted qualitative field observation, I expanded upon this factual data to include my initial interpretations of the field experience in the form of personal reflections and side notes.

See Appendix D for a detailed description of the methods I used for collecting classroom observation data.

In all observational settings, accepted and appropriate techniques were employed to ensure study rigor and minimize the impact of the researcher on the observational setting.

Documents and Other Artifacts

Documents and other artifacts of several forms were collected to help record and describe the case study experience. Documentation data I collected include such things as researcher journal notes, participant faculty emails, survey instruments, and instructional materials used in their teaching activities. The following sections provide additional detail on how I went about collecting these documents and teaching artifacts.

Teaching Artifacts

My purpose in gathering teaching artifacts was to address two areas related to study rigor: (1) validation of discovered evidence through the qualitative process of member-checking and (2) ensuring depth and richness of the story I would ultimately be able to tell of each of these four faculty members.

The value of collecting many different data types is well understood in qualitative methodology—particularly with case-study efforts. Therefore, I adopted a relatively liberal approach in gathering teaching artifacts. In some cases, they simply sent to me a variety of digital artifacts directly, usually as email attachments. In other cases they gave me permission to extract materials directly from their online course areas. In general, all four faculty participants were very willing to provide as many teaching artifacts as I wanted. It is important to note that because of these four individuals' predilection to

leverage technology in their teaching it was relatively easy for me to gather extensively from each of them simply by mining their online course areas.

My analysis of these teaching artifacts was largely limited to general observation of the artifacts so that I could compare them to see if they were consistent with the themes I had developed to that point. My plan was to also use these artifacts as part of the overall story I told of each of the participants.

Researcher Notes

In any qualitative study, notes produced by the researcher are a very relevant source of data. In this study, I relied extensively on my personal researcher notes. Ways I used researcher notes included: in the form of descriptive data gathered during interviews and observations, as a source of rich thematic and coding data during the analysis, and as meta-data in the form of personal reflections throughout the entire research process.

In designing how I would gather and maintain researcher notes, I used a combination of formal training in my qualitative methods classes, recommendations drawn from the literature, and previous experience as a qualitative researcher. In general, I used hand-written notes captured in spiral notebooks dedicated to field note data collection. I purposefully kept them free-form in nature to allow for maximal opportunity to capture virtually any thought that came to my mind related to what I observed. Sometimes these notes were closely linked to specific analytical activities of certain data-sets (e.g., coding of interview transcripts) while at other times they were in the form of newly constructed versions of previously analyzed data. Frequently, I simply needed to capture thoughts that I did not want to lose and researcher notes were where I captured these thoughts.

My process of formal coding and theme analysis involved technology-facilitated data-parsing as well as manual analysis of hard-copy data. In these cases, hand-written researcher notes were a vital source of data used in the final study report. See Table 3 (Technologies Used to Collect and Analyze Data) for a summary of the technologies used to collect and analyze the data.

Table 3

Technologies Used to Collect and Analyze Data

Technology	Use
Sony ICD-P620 Digital Audio Recorder	Audio-recording of interviews with case-study participants, including department chairs. Also supports industry-standard MP3 format.
Microsoft Office (Word & Excel)	Word: Transcription and storage of recorded audio-files. Excel: Used in developing data matrices and tables of parsed data.
Ethnograph v6.0 (Qualis Research) URL: http://www.qualisresearch.com/	Used in direct coding of raw interview data and flagging of key quotes for evidence representation. Assisted in overall organization of interview analysis.

Summary of Data Collected

By the time I had captured multiple audio interviews with the participants and their department chairs, completed three classroom observations for each of them, and collected a wide array of teaching artifacts, I had reached a point of relative case exhaustion. At this point, I now had sufficient data to proceed with the final stage of analysis. See Table 4 (Summary of Data Objects Collected) for a recap of the entire set of data objects collected in this study. (Note that two of the three classroom observations for the fourth case participant were gathered using the online courses they were teaching during the fall semester of 2009. Thus, the hours of observation for that participant are less meaningful and are estimated.)

Analysis and Representation

My analysis and representation activities were designed to address the specific research questions as presented in the introduction of this report. To accomplish this, I drew upon techniques for analysis using the recommendations of Creswell (1998), Denzin and Lincoln (2003), Stake, (1995) and Yin (2003, 2009) as they are appropriate for the analysis of rich data gathered via case study methodology. The more specific goal of the analysis was to uncover patterns and themes from the data in order to provide a richer understanding of the participants' motivational attitudes and the extent to which certain external factors influence their behavior with respect to technology in their teaching.

To analyze the data, I employed an open coding technique which is common in grounded theory study. Following the recommendations of Creswell (1998), I approached the coding in several stages. After the initial coding effort, I organized the codes into

categories which I then further broke down into subcategories. Using these subcategories, I was able to dimensionalize the data into relevant themes. My first goal was to understand each case as an independent experience, so this open coding analysis was applied at the individual case level. Once I completed the coding analysis of each individual case, I then used cross-case analysis (Yin, 2009) to look for consistencies (or inconsistencies) across all four of them. This last layer of cross-case analysis helped me to address the demographically-oriented questions included in this study (age, gender, professional status, department).

To facilitate a more efficient and effective analysis of the data, I employed software tools commonly used in qualitative analysis (Weitzman, 2003). Some of these tools were specific to qualitative analysis (e.g., Ethnograph v6) while others were more general purpose in nature (e.g., Microsoft Word and Excel).

Representation of the results in this report are in the form of a scholarly narrative that has been enhanced through the use of visual exhibits and tables, a common practice in ethnographic analysis (Spradley, 1979). The themes and experiences of the faculty participants have been visualized with coded text, participant quotes, and other relevant artifacts drawn from the entire collection of case-study data.

Table 4

Summary of Data Objects Collected

	Case 1	Case 2	Case 3	Case 4
Audio Recording				
Baseline	X	X	X	X
Herzberg	X	X	X	X
Customized	X	X	X	X
Department Chair	X	X	X	X
Teaching Observation				
Classroom #1	X	X	X	X
Classroom #2	X	X	X	X
Classroom #3	X	X	X	X
Technology Artifacts	X	X	X	X
Count of Collections	8	8	8	8
Approximate Hours	6.0	6.0	6.0	4.0

Table 5 (Summary of Methodological Sources) provides a summary of primary methodological sources I found most useful in establishing my approach for analysis and representation. I have also included how I employed their recommendations. In the discussion following the table, I provide a more detailed explanation of each of these sources and how they informed my approaches for analyzing and reporting the study results.

How I Used Creswell

Creswell (1998) recommends that the researcher start with a general review of the information to get a sense of it using memos and reflective notes. I used the initial interview summaries and memos as a basis for follow-up interviews to provide for triangulation and member-checking (pp. 142-145). He recommends that you study participants' words carefully and look for metaphors and other important pieces of evidence in their language. At this stage I followed his recommendation to begin data-reduction in the form of tables and arrays. See Appendix J for an example of analyzed data in the form of an array.

Table 5

Summary of Methodological Sources

Source	Use
Creswell, J. (1998). Qualitative Inquiry and Research Design: Choosing Among Five Traditions. Miles, M. and Huberman, M. (1994). Qualitative Data Analysis: An Expanded Sourcebook. Second Edition..	General guidelines high-level strategies of analysis. Emphasis on a researcher-centric, iterative approach.
Yin, R. (2009). Case Study Research: Design and Methods (4th ed.). Boyatzis, R. (1998). Transforming Qualitative Information: Thematic Analysis and Code Development.	Specific strategies and techniques for thematic developing and coding structure.

In terms of initial theme development, Cresswell (1998) suggests that you start with a short list of five or six categories or codes. Over time, you may generate many more themes which you should reduce down to a smaller number for the final narrative of the case study. One technique described by Creswell that I found particularly useful was his discussion of the analysis spiral in which the researcher continually reworks the data in iterative stages using a variety of analytic techniques. The objective of this spiral approach is to generate multiple versions of representation until a single account or story emerges to be reported. Throughout this spiral process, the researcher is moving from reading and memoing to describing, classifying, and interpreting (Creswell, 1998, p. 143).

The best possible outcome of such an analytical approach is to take the original raw data from the case participants and produce theories or hypotheses built upon that data. Cresswell (1998) provides a conceptual model (p. 145) in the form of a hierarchical tree (Figure 1) which takes things from the least abstract (raw data) to the most abstract (theories/hypotheses).

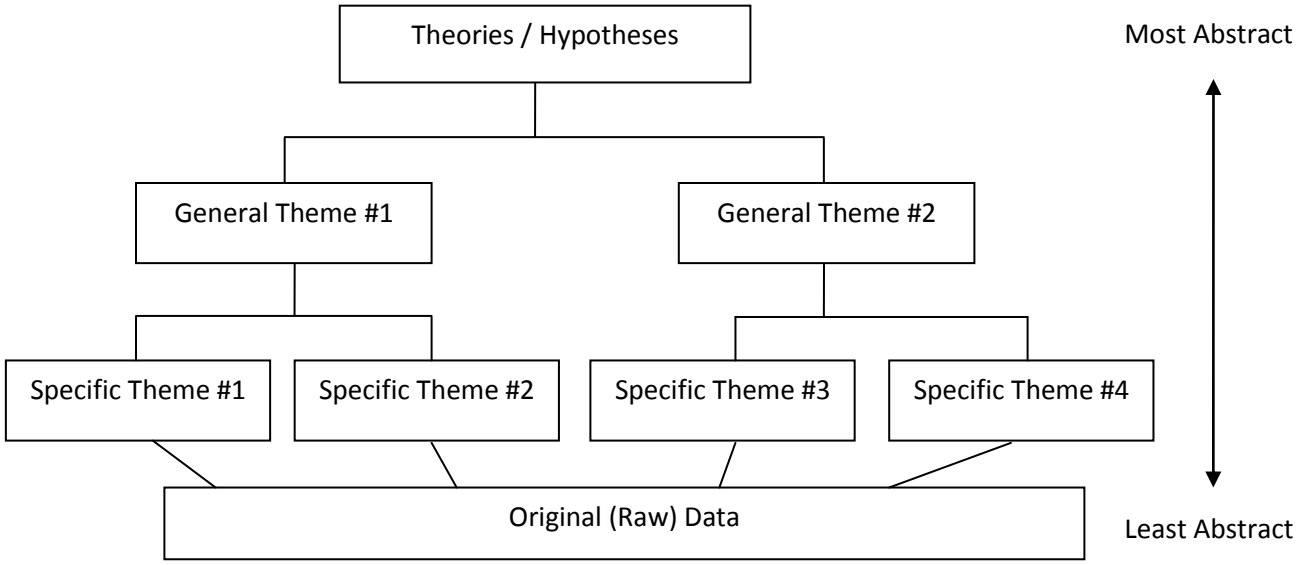

Figure 1. Cresswell's Hierarchical Tree

How I Used Miles and Huberman

Miles and Huberman (1994) emphasize the goal of the researcher in building a logical chain of evidence and is similar to how I used Creswell in five areas: (1) producing researcher comments written in margins of field notes and reflective passages, (2) producing draft summaries of my field notes, (3) developing codes and memos, (4) drawing contrasts and comparisons and (5) identifying of patterns in the data, discovering themes, and creating specific coding techniques to identify those themes in the data.

How I Used Yin

Yin is well known among qualitative scholars for his reputation as an expert in case study methodology. I used both his 3rd (2003) and 4th (2009) editions for guidance. He presents four general strategies that the researcher may choose from when setting out to analyze a case study project: (1) reliance on theoretical propositions, (2) development of case descriptions, (3) use of both qualitative and quantitative data, and (4) examination of rival explanations. Of these four strategies, I found the first one (relying on theoretical propositions) the most appropriate for my study. In this approach, the strategy in the analysis is to follow the a priori theoretical propositions that led to my study in the first place. As Yin pointed out, this is the generally preferred approach for most case studies. I therefore felt comfortable adopting this approach for my analysis.

According to Yin, the goal in case study analysis is to develop a full, rich explanation of the data in response to the how and why questions of the original study design. Examples of such questions in my study might include: How do the faculty members in this case study balance their efforts in teaching with their other professional responsibilities? Why do they seem more intrinsically motivated than others in their

departments or across campus? How do the various external factors possibly impact their overall motivation?

In approaching the mechanics of the analysis, Yin (2009) emphasizes that the researcher should be the primary analytical tool but can utilize other resources (e.g., technology) as long as they support the researcher and not the other way around (i.e., researcher adapting to the technology). Of the five methods of analytical techniques he discussed, I found "Explanation Building" to be the most appropriate for my study. In this approach, the goal is to "analyze the case study by building an explanation about the case" (p. 141). Along the way of explaining the case, the researcher should attempt to define how and why certain things happened and to develop new directions for further study. This approach aligned nicely with the early-stage nature of my study design and gave me a clear direction in which to proceed.

Three of the other methods (Pattern Matching, Time-Series Analysis, Logic Models) did not seem appropriate for my study, but the last approach (Cross-Case Synthesis) seemed at a high level to be worth considering given the multi-case nature of my study. However, Yin recommends using the multi-case approach in studies that include a very large number of individual cases and reduction of large amounts of data may be necessary. With a short list of only four individual case studies, I was concerned about being able to take full advantage of that approach. However, in spite of the small nature of my study, I ultimately chose to proceed with cross-case analysis in order to more fully address the study research questions. Given that Yin does not establish a minimum number of cases to use in cross-case analysis, I felt comfortable in my choice to use it even with my study of only four cases.

Another technique recommended by Yin that I chose to employ was his suggestion that the researcher spend time "playing with the data" and organizing it in various ways—including arrays and categories—as a way to visualize it better. It is worth noting that I found this approach particularly appealing because of my long background in computer science. As a computer scientist, manipulating otherwise discordant data into structured forms such as tables or arrays is very natural for me. I could readily envision a fully-parsed and structured representation of the data sets as a way to help discover themes and other repeating elements within and across the individual cases. It was also a good way of reducing data without losing context. Data reduction through a tabular representation in this way helped me get to a level of substantive analysis quickly and effectively.

Overall, the more I used Yin as a primary source of methodological technique, the more I understood why he is considered such an expert in case study analysis. He describes things using clear and logical language and in ways that provide a common-sense approach for conducting case study research.

How I Used Boyatzis

I came across Boyatzis (1998) while reading Yin (2009) as a cited reference for theme and code development. As was the case with the other primary methodological sources I used in this analyis, I liked how Boyatzis relies heavily on the direct capacity of the researcher to analyze the data effectively.

Guidance from Boyatzis that I found especially useful while developing themes and codes include: (1) the ability of the researcher to recognize patterns in the data, (2) theoretical sensitivity on the part of the researcher (e.g., the researcher should be able to

recognize what is important in the data and give it meaning), and (3) care on the part of the researcher to avoid projecting his or her own thoughts onto the data. That is, the data should do its own speaking and the job of the researcher is to hear that voice and report it as objectively as possible.

In terms of the process of inductive theme and code development from the data, Boyatzis describes a four-step process which is presented in Table 6. Refer to Appendix I (Theme and Code Analysis Results) for examples of theme and code analysis results using the process and structure suggested by Boyatzis.

Scholarly Rigor

Since this was a study involving human subjects, I took appropriate steps consistent with federal and campus guidelines to ensure the well-being and protection of the faculty participants. Institutional Review Board (IRB) approval, participant disclosure, and data protection guidelines were followed. In addition to the faculty participants themselves, similar protection steps were employed with their departmental chairs. In the classroom observations, students were secondary to the faculty participants and, as a result, no direct or identifiable student data was gathered or reported.

Personal Subjectivities of the Researcher

Because of the influence of personal subjectivities, an important step in establishing the rigor of a qualitative study lies in proactively exposing, exploring, and addressing potential influential issues derived from the researcher's personal relationship to the study, its goals, and the participants in the case study. As described by Van Manan (1991), "the fieldworker has as much of a personal pull towards the subject as an interest in adding to the body of knowledge" (p. 34). For me as a researcher, this concept is

highly relevant to the nature of this study and my closeness to the data in the form of the faculty members being studied and their experiences. Consistent with the spirit and tradition of qualitative methods and to add to the rigor of my overall study methods, I have provided a full personal subjectivity statement with respect to this particular study.

The full narrative of this personal subjectivity statement can be found in Appendix G and describes in story form the close relationship that exists between my roles as both a researcher and a professional administrator on the campus where the four case participants work. The point of telling this personal story is to highlight how my daily work overlaps directly with many aspects of the study. Numerous times throughout each work week, I come in direct contact with many different faculty members on our campus. Through these contacts, I have developed professional and personal relationships with many of them. My awareness of their attitudes towards teaching in all of its facets has been greatly developed through these experiences. The subjects of my study were not simply anonymous strangers who were selected randomly from a large pool of candidates that I had never met. Rather, they were individuals that I knew well.

It should also be noted that my interest in the results of this study will have value to me in ways that are not sterile or antiseptic. Instead, these results are likely to have direct relevance in my daily work at the university. While it was not realistic to expect complete objectivity, it was important for me to account for these subjectivities through careful attention to scientific rigor.

Table 6

Boyatzis' Four-Step Process for Theme and Code Analysis

Step	Description
1	Reduction of the raw information in order to understand and internalize it better and to reduce it to a more manageable size.
2	Identification of themes within the subsamples with less concern about detailed precise descriptions of the themes, but instead more concerned with recording hints of nascent themes within each subsample. (Note that the subsamples of this study were the individual interviews, observations, and artifacts within the four case groupings.)
3	Comparison of themes across subsamples. When the researcher feels that all of the potential themes have been discovered, he or she should stop and list all of the ones derived so far. Each of the themes in this list should be written and re-written for additional clarity and rigor. Finally, the researcher should go back and re-read the original raw data to validate each of the themes. (Note that in my study, the classroom observations functioned as an effective means of validating themes—even though I had not originally intended for them to function that way.)
4	Creation of a coding method to identify these themes in the raw data itself (or future similar data). Specific activities in this step include: (a) Rewriting the theme for maximum clarity and terseness, (b) Validating that the theme can be found in the data. (not imagined by the researcher.), (c) Ensuring that each theme has been described with the fewest number of words, and (d) Ensuring that the list of themes has been reduced as much as possible without losing meaning or generating confusion.

Addressing the Need for Scientific Rigor

In spite of the many challenges I faced as a qualitative researcher and the inherent risk associated with being very close to the data, there were still many available options to help maintain a high level of scientific rigor. Among the many techniques that are commonly used in qualitative research (Creswell, 1998; Merriam, 1998; Miles & Huberman, 1994; Yin, 2003), there were four that I used in various ways in this study: (1) triangulation, (2) peer reviews, (3) member checks, and (4) rich/thick descriptions.

In triangulation, the researcher uses multiple sources of evidence to re-examine identified themes or perceptions. In my study, I accomplished triangulation through the variety of data sources collected for each case participant. This included participant interviews, classroom observations, teaching artifacts, and departmental chair interviews. In addition, the prolonged period of time for data collection and analysis provided additional time for triangulating identified themes where appropriate. Using a peer review process, I engaged other researchers and professional colleagues in examining and critiquing my analysis of the data. Peer and committee input was particularly helpful in two important areas: (1) participant selection and (2) analysis methodology. In looking back, these external inputs were helpful in addressing the personal subjectivity issues previously identified and described.

Conducting member checks is an opportunity over the course of the entire analysis process to solicit involvement by the participants themselves in reviewing the analysis and giving feedback on the credibility of the results. I conducted member checks with my participant faculty members primarily through the exhaustive interview process

in which follow-up questions were designed to verify, clarify, or correct previously identified themes or observations.

Finally, one of the most powerful tools in qualitative research towards maximizing scientific rigor is the use of rich and thick descriptions of the data. Rather than providing concise recaps of the results in an objective form as is typical in quantitative research, qualitative study data often lends itself to being represented in a variety of forms with multiple dimensions that are rich in both meaning and depth. The additional rigor in this technique stems from the opportunities that such rich descriptions present for the reader to participate in the analysis and to draw their own conclusions from the breadth and depth of data collected.

Study Limitations

A central component to the success of this research effort was the identification and selection of appropriate faculty members whose teaching activities and behaviors were sufficient to meet the exploratory objectives of the study. Therefore, a potential limitation was the extent to which appropriate case-study faculty members were found who met the selection criteria and were willing to participate over an extended period of time. I attempted to address this risk through a carefully designed selection process that sought to ensure the selected case participants were properly representative of the study objectives.

One of the factors I explored in this study was that of the potential influence of campus culture on the motivational behavior of the case study participants. It is important to note that all four of the participants were drawn from the same institution and thus interacted with a common campus-level culture. This limited the extent to which

observations related to campus culture would have meaning beyond the specific faculty members included in this study and the campus where they worked.

Another limitation was the extent to which I could ensure that the data could be collected in times that aligned with both the academic calendar (for the benefits of the participants) and timeline of the study. I addressed this concern by defining the scope of each case simply around the story of the individual participant and observing their extended use of technology in multiple contexts in an open-ended way. This was in contrast to using a fixed project or prescribed window of time to define the scope of each case.

My preexisting professional relationship with the case participants presented additional risk to study rigor. I addressed this concern through a personal subjectivity statement presented previously in this chapter along with a variety of techniques specific to personal subjectivity issues. (See also Appendix A for information regarding my validity as a researcher in this particular study.)

Finally, it is important to recognize that the primary goal of a qualitative study is only to explore and describe human experiences and phenomena so that the researcher can gain increased understanding of complex behaviors. The goal of qualitative research is not to produce results that can be generalized or reproduced. That purpose is typically associated with quantitative studies that utilize an alternate set of methodologies and analytic techniques. Therefore, the outcomes of this study are to be viewed as useful only at an incremental level and improve our understanding of the highly complex nature of faculty motivation relative to their teaching activities—or possibly suggest new questions for future research.

Chapter 4: Study Results

Introduction to the Results

In this chapter, I will present the results of this study. I have organized the results in three broad areas: (1) overview of the approach I took to analyze and present the results, (2) the results of the analysis of the individual case participants presented in the form of four stories along with what I learned from them, and (3) a synthesis of all four stories and their individual themes into a common set of results through the use of cross-case analysis.

Overview of Approach for Analysis of the Data and Representation of the Results

As this was a qualitative case study project, I approached the analysis of the data that I collected with two goals in mind. My first goal was to give the data an opportunity to express itself and to provide an honest representation of each of the four case participants, but remain within the broad framework of the study design. My second goal was to attempt to address the specific research questions. Essentially, my approach was to take advantage of the open-ended nature of case study analysis in order to allow for maximum discovery of relevant insights drawn directly from the voices of the participants themselves, while at the same time filtering these discoveries through the study questions.

As noted by Yin (2003, 2009) and others, case study methodology offers the researcher broad latitude in terms of analysis. This can range from an open-ended exploration of the data to see what is there and limiting the results to just telling that story, all the way to a narrowly-focused analysis of very specific research questions. The former of these two options (open-ended analysis) is very useful when little is known

about the topic of study and the researcher is trying to find a starting point. If you know virtually nothing about an area of inquiry, then any direction you take and any place you end up is better than where you began. This method is worthwhile for generating launching-off points for follow-up studies. The latter option (closed-end analysis anchored in specific questions) is perhaps a more traditional research activity and often the goal of case study analysis. But, it requires the inclusion of appropriate design components that may not be needed in a purely exploratory effort.

The central theme of this study, the exploration of faculty motivation with respect to use of instructional technologies, in many ways straddles both approaches. While understanding faculty motivation is generally a poorly-understood area of inquiry, it is clearly not at the starting gate. As was discussed in the background literature section of this report (Chapter 2), while a variety of studies have explored faculty motivation with technology in teaching, they have provided very little in the way of hard conclusions that are replicable or appropriate to be applied to the entire faculty population. The previous work on the focus of this study is inconclusive at best, and could be seen as generating more questions than answers. On the other hand, a number of these prior studies still suggested some interesting directions for additional research. The specific questions I included in this study allowed for both types of analysis: on the one hand they are anchored in previous studies, thus offering the comfort of more traditional research exercises aimed towards practical application of outcomes, and at the same time, because we have only brushed the surface of understanding, there remains ample room for additional research.

With a specific list of research questions identified to address, I did not have the luxury of simply wandering through the data without clear direction. My analysis, therefore, had to accomplish dual objectives: to focus on finding new and relevant insights into specific questions, while still leaving room in the process for undiscovered insights to emerge from the data on their own. I was able to accomplish both objectives by using a variety of well-established methods recommended by case study scholars as I described in Chapter 3 of this report.

The qualitative case study approach also gives the researcher broad latitude in how to present the results. My goal in organizing the results of this study was to be both disciplined and purposeful to the study's research questions, while keeping it as readable and engaging as possible. In this light, there were two traps I sought to avoid: I did not want my insight to relevant questions becoming lost in dry and antiseptic analyses; nor did I want to produce colorful and entertaining prose that failed to provide useful information or address the practical nature of my study. Fortunately, qualitative methodology provides a variety of suitable approaches to help the researcher accomplish both of these goals when representing results. Drawing on Cresswell's (1998) analysis spiral and hierarchical tree approaches, I applied an inductive approach consisting of three tiers of analysis and representation.

In the first tier of analysis, I started with the raw data itself. The result of this first round of analysis was a set of observations and general themes based on independent analysis of the individual case studies. In this way, the foundational elements of the final analysis and representation are anchored directly in the original data collected from the four individual case participants and their personal stories.

In the second tier, I used cross-case analysis, as recommended by Yin (2009), to look for commonalities and consistencies (or inconsistencies) across all four of the cases. Although Yin cautions about the need to include a large number of cases when using cross-case analysis (as well as the associated volume of data and required analysis), I felt that my four cases were sufficient to be explored in this way. Cross-case analysis could potentially provide an even more cohesive and consistent way of addressing the research questions included in this study. Data analysis from the four individual cases (Tier 1), provided the input to this second tier of analysis.

In the third and final tier of analysis and representation, I took the results of the cross-case analysis (Tier 2) and fed them into an exploration of the specific research questions included in this study. Representation of the results derived from first two tiers (four individual case analyses and a single cross-case analysis) is included in this chapter of the report. The results of the third tier (research questions analysis) are in the conclusion discussion (Chapter 5) of this report.

Revisiting the Research Questions and Related Factors

Embedded in the primary research questions associated with this study were four categories of factors to explore for their relative influence on faculty motivation regarding teaching with technology: (1) intrinsic versus extrinsic influences, (2) career stage (pre-tenure/post-tenure), (3) demographic factors including age and gender, and (4) campus and departmental culture. In addition to these specific potential influencers, the study also sought to better understand how faculty members approach the introduction of instructional technologies as a part of their overall professional responsibilities (i.e., "balancing" multiple responsibilities). Note that the exploration of "balance" is closely

related to the pre/post tenure career stage part of the study, but I treated them as separate potential influences. In the following discussion I expand on why all of the above factors were included in the study.

I included the broad category of intrinsic versus extrinsic influences because it frequently appears in the literature in studies specific to faculty behavior. There is also a broad body of research around white collar worker motivation that can be found in areas related to the study of psychology, human resources, and management. In spite of the relative wealth of previous work on intrinsic and extrinsic factors in the workplace, what the existing literature on faculty motivation (Bess, 1997; Blackburn & Lawrence, 1995; McGee & Diaz, 2007; Schuster & Finkelstein, 2006) tells is unclear regarding the complex set of expectations, rewards, and professional demands that ultimately influence the behavior of higher education faculty. While a number of studies reported on the influence of various internal and external factors on faculty teaching activity, I could find none that directly explored intrinsic and extrinsic factors. Given the competing influences of internally-derived behaviors and external mandates that occur so often on college campuses, there is a strong rationale for developing a clearer understanding of how both categories of influence how faculty invest in their teaching and with technology.

The investigation of career-stage influences on faculty motivation in teaching is particularly valuable on a research-oriented campus where successful tenure candidates must be accomplished in a variety of areas beyond teaching. The influence of the tenure process affects faculty members at all stages of their career, whether they are working to achieve tenure for the first time or seeking professional advancement throughout their time in the professoriate. It is thus worthwhile to better understand how these faculty

members are able to remain innovative with technology and without sacrificing in other areas that ensure their advancement.

Inclusion of the broad consideration of how faculty members balance their innovative efforts using teaching technologies with their larger set of responsibilities is particularly relevant on a research campus where they are expected to excel in many areas beyond the classroom: production of new scholarly work, securing grants, service to the campus and community, and so forth. While this question is closely aligned with the pre- and post-tenure factor, the question of balance does not stop once tenure has been achieved: it remains a consideration for faculty members throughout their professional careers. On research-intensive campuses (including where this study was conducted), this issue is even further magnified.

Exploration of departmental culture, age, and gender was suggested from a combination of evidence in previous studies (see: Chapter 2). In addition, all faculty members naturally fall into these categories as a by-product of historical norms of institutional organization (departments) and the biological facts of life (faculty, like other human beings have age and gender). Adding these three factors into the study design was relatively simple and could potentially enhance the richness of the overall results with minimal cost in additional design or effort.

Results of the Analysis

From a research perspective, understanding faculty behavior and discovering the drivers that influence their choices in terms of time and effort is a complex endeavor. By limiting the scope in this study a single subset of highly motivated faculty members, my hope was that at least one step could be taken toward developing a more complete

understanding of the rich motivational context that influences faculty members in higher education.

Four individual faculty members were selected to participate in this project as individual case studies. While they all came from different academic areas and represented a variety of ages and career-levels as well as both genders, the one characteristic they all shared was a high level of investment in their teaching. More particularly, they had made an above average investment in using instructional technologies to expand the learning experiences of their students. Although all four of these participants were previously known to me through my ongoing role in the teaching and learning center on the campus, prior to this research, my interactions with them had been limited to traditional support issues on an intermittent and casual basis. While they were regulars to the teaching and learning center where I worked, I had never considered the question of why they exhibited their unusual attitude regarding technology.

Over the course of approximately twelve months of close interaction with each of them, I had the opportunity to gain a good understanding of why they were such regular attendees to the teaching-related activities our center offers for the campus academic community.

Tier 1 of Analysis and Representation: Four Case Stories

In the following section, the four cases are presented as individual stories. As often as possible (and appropriate), the findings are represented in the natural voice of the participant in the form of both direct quotes and observed experiences of their teaching in the classroom. Supporting instructional artifacts (technologies, exercises, etc.) that are

representative of their technology innovation are included as additional evidence of the reported themes.

As you read these four stories, it is important to remember that the purpose of the investigation was simply to better understand why they behave the way they do (with exceptional levels of innovation). There was no attempt in this study to rate the quality of their innovation or judge the learning value it might have offered to their students. My objective was to understand why they behave the way they do regarding high levels of activity with technology, not rate how well they do their jobs as teachers.

The Story of Allen Williams (Case Study 1)

> Fundamentally I like the fact that there are different things to do every day. One day you're teaching…One day you're doing research…One day you're doing training for industry…there's just such a wide variety…I never get bored with what I'm doing because there's always just so many different things. I like working with the students—they're fun. I like it when…you take them when they don't know a lot of things and you kind of add that knowledge and they go away and they get jobs and they come back and they tell you all the wonderful things that they're doing…working with them…doing those things are a motivation. Because we're at the point where if you're not using technology, you're not even on the curve anymore. At least that's the way I think about it.

Allen Williams is an associate professor in the Internet Marketing Program which is a relatively young program at the institution. He came to the University of Memphis directly out of his doctoral program at Ohio State University about 4 years ago.

When you first meet Allen, you are likely to be struck by his energy and enthusiasm—on just about any topic or activity. Whether you are discussing new approaches in the classroom to engage students, pursuing outside partnerships with the industry, or even college sports, he is eager and excited. You readily perceive that Allen engages life in a very full way. Layered on top of this enthusiasm is his strong work ethic which he attributes to his growing up on a Midwestern farm where you "...work from dusk until dawn...or from dawn until dusk [and] used to get three hours of sleep." Like most young faculty members at the University of Memphis, Allen has a professionally demanding position that expects strong performance in his research along with a busy teaching load, all of which is accompanied with an expectation of service to both the campus and business community.

The Internet Marketing program is contained in the management department in the college of business. It is currently limited to undergraduates only and because of its relative newness on campus is in many ways still in a startup mode. Because of its early stage of growth, class-sizes tend to be small with a typical section containing only 12-20 students. The program is also rather small in terms of faculty community with only five faculty members in the entire program counting the Allen and the program director. He is also the most senior member of program having been on the campus the longest of any of them including the director.

In this program, research and service to the community seem to be highly overlapping with much of their research funded by industry partners and focused on applied application. Because of this close association with industry, the culture of the program appears to be tightly associated with graduating well-qualified new workers to

go into industry. This emphasis on graduation rates creates a very student-centric focus among the program's faculty. As I learned in the interviews, they have almost a "customer service" orientation to their students both in and outside the classroom.

Some of this emphasis on students as customers and delivering them a quality educational experience may also be a by-product of industry itself. This student-centric attitude in their program was prominently exhibited by his program chair. At several points in our interview he became very animated about their attitude toward students such as when he shared the following:

> I would say we're very student focused, very interested in preparing the students the best we can for industry. So, obviously, teaching is very important to us. Instruction is very important. And that comes from a service perspective that we all have as we got into this business at one time. The service business is the internet marketing business. So we care as much about our customers and we look at students as a customer. I would think that we have a progressive—a very progressive attitude towards teaching and instruction. Inherently, because of the discipline we're in and how we treat the students and how we're committed to their education…

In short, it seems that the very culture of Allen's program is geared to rewarding effective teaching and thus at least reduces the extent to which he is penalized professionally for putting a great deal of emphasis on incorporating technology into his classes. What I ultimately observed about Allen is that his tendency to invest in his teaching activity exists independently of the program culture. Thus, while the teaching-

centric culture of his program area has not actively suppressed his use of technology, nor does it appear to materially increase his efforts.

Competition and Differentiation

Two strong aspects to Allen's personality that came out of the interview process were a highly competitive spirit and his need to differentiate himself from other faculty members. My perception is that Allen identifies strongly with his role as a teacher and wants to excel in that role. Competition and differentiation through technology innovations provide an outlet for him to excel in unique ways. Both of these personality traits came out on multiple occasions during the entire interview process.

Below are some examples of his expressing a strong need to differentiate himself from other faculty members and how he uses technology in the classroom as mechanism for separating himself from the others.

> Whether I need it through technology or other methods, technology is just a kind of that way to do things differently. You know in my mind, I think in many ways different is better.
>
> You just think about it and it doesn't make sense just to do it the old fashioned way…Well, the old fashioned way…lecturing, assigning a case study, go home, read this, write the answers. That's just the old fashioned way that doesn't make sense any more. Because there's so many more tools that can do things so much more effectively. And to be an effective teacher, you've got to…I believe you have to find a way to harness those new powers, those new abilities to get information across to the students…but I think you've got to find another way to get them really excited about what they're doing—for it to stick.

Examples of his competitive spirit were also relatively frequent in our dialog. The following statements provide evidence of how he sees innovation with technology as means of exercising this competitive spirit relative to his professional peers.

> …that's just a part of what I do. And when I say being different, it's working harder than the next guy—doing things better. It's always trying to be one step ahead of everybody else…It's trying to be one step ahead of everybody else and that's that differentiation.
>
> Well, I think there's a little of competition in everything a person does...At least I think there is. Competition…makes it interesting. As long as you're competitive and you're not out for blood or anything like that...even if you're in academics, it still makes it enjoyable.

He even tries to pass this spirit of competition on to his students telling me that "I always tell students 'Look this is college, but when you leave here…there are winners and losers.' I'm trying to give you the tools…so you can win over the competition in life."

He was also reflective of others in the teaching profession and the variety of ways in which different faculty members approach teaching. Allen's comments supported my findings among all four case participants in this study that much of what drives them to innovate is intrinsically derived:

> I mean there [are] some teachers that just do it—they just want to be excellent teachers. They have an absolute passion for it and if they can do better they will do it. And that's evidence through…you know who those faculty are on campus. They want to be great teachers and so to do that, they will innovate. They will

> differentiate to be great teachers. That's their passion. They absolutely love teaching—would never change it. Others do it because they have to. And others would just not do it at all. They're happy to just stand in front of students and lecture for an hour and a half and then go back to their office.

Buzz and Excitement from the Students (Feedback)

One source of motivation for innovation with Allen is how the students react to his uses of technology in either positive or negative ways. Often he described his awareness of the students' reaction to his techniques using terms such as 'buzz' and 'excitement.' He described on several occasions how the students sometimes would positively react to his new ideas creating among them a perceptible level of engagement and excitement about the class.

The phenomenon works this way: His creative use of technology and other teaching approaches increases student levels of excitement which he finds rewarding. He is then motivated to put more into making the class more exciting. The more he innovates, the more positively the students react to it. The cycle appears to be self-perpetuating and continues to spiral upward in terms of its affect on Allen's level of activity with technology. The following set of statements from our interview sessions captures this phenomenon clearly.

> The buzz has got to come from the students. That's why I think buzz is so important. The students get excited about things that are new and different and exciting. I don't necessarily worry about the buzz from outside. I mean it's nice, don't get me wrong. But when it makes students so much more engaged in learning if it's something exciting and different for them…When I did the whole

> PDA thing—they were just tickled pink. They would have done anything I asked them to. Because someone just gave us a PDA—it was brand new to them. Because they're talking about it. I've got students—they come in and they ask me—they're sophomores—"how do I do my schedule so I can take your 4700 class in my spring semester of my last year?" That's the buzz…the upper classmen are talking to the underclassmen.

Networking with Colleagues

The influence of interacting with others as a means of stimulating new approaches with technology was somewhat evident with Allen although not to the same degree as with other participants in the study. There was some evidence that Allen directly values dialog with others such as when he described the value of interacting with the technology support center staff: "…Corey and I had talked about open education, sharing knowledge, and all those different things…"

Likewise, his program director also described a culture among the faculty to collaborate on teaching innovation as well as Allen's contribution to those activities:

> We have an expert here in one of our faculty members. He does tell us how he's using his technologies. What is he using these technologies for in his class? And that the other faculty members—we have another one right now—we're very interested in finding out how he's using it so we can adopt some of the same practices.
>
> Well we know that the internship coordinator…in our discussions with Allen and in our faculty meetings [he] wants to know how he's using technology

> effectively…And so Allen is working with him on…using technology in the classroom.

Influence of Campus Administration

The campus administration fills an ambiguous role with respect to Allen's motivation. On the one hand, like many faculty, he described his tendency to distrust (or at least walk carefully around) overt directives from the campus administration:

> I don't see that the administration of this university is too bent of being at the forefront of something. They're just happy moving along…So I don't think the administration really helps it, but they're not necessarily hurting it. They provide…the tools…but I don't think they push it in any way.

He also provided evidence on several other occasions of the value he places on the various campus-wide resources that support and sustains his teaching efforts down at his level. For example, in the following discussion, Allen describes some of his experiences working with professionals in the campus-supported faculty support center and how they were formative in his exploration of various innovative technologies:

> Because of what Joanne and Corey said, I knew that I was doing something that…should be happening here. I came from…super technology-enhanced places. And, so to know that, well I'm bringing something new here that that's nice. And it was a recognition. That was good.

Thus, the campus administration's influence on Allen's level of activity with technology is ambiguous in that while he describes its level of support in skeptical terms, he also ultimately depends upon campus-supplied resources to support his innovative activities.

Departmental Culture

Regarding local academic culture (department or program level), Allen's circumstances are a bit unusual among the four case participants in that he works for a relatively autonomous start-up program that is contained within a larger, more well-established department. The data revealed significant cultural differences between his local program and the larger academic department within which his program is contained. At the departmental level Allen described an environment in which creative efforts, particularly those types involving technology innovation, are generally frowned upon.

> …but these are the people…are telling me "You can't do online education. We don't care what you're doing with technology. That's not necessarily an important thing. Well that's nice Allen." These are colleagues—they could care less.

Yet his local program culture emanates an extremely positive, customer-driven attitude about teaching in the broadest sense and a generally supportive reaction to Allen's aptitude at advancing the use of technology to help students. This positive attitude towards technology innovation within his program area was particularly evident in my interview with his program director when he told me:

> OK, there is an intrinsic needle over here to take this program to a level that is unrivaled at the University of Memphis…Everyone is supporting us to do great things…and the program is "Well, we want to grow. We want to do these things." And so…it's nice to have that same culture [with] what you want to do. It's not like I want to be innovative and they're saying "No, no. We don't want to innovate." They're quick to "What do you want to do? How do we get it done? What can we do to kind of do the next thing? To get the next step?" And so it

> impacts me…There's very much a perception and a feel to the school that's very different. When faculty come up to visit they say "Wow! This is great over here!" It is just very different.

Perhaps his local program culture provides a "safe" place that, at best, does not penalize Allen Williams for the extra time and effort he puts into his teaching role. It is important to note, however, that, in spite of the competing, ambiguous, and sometimes confusing attitude of his location department and the campus administration, Allen persists in his efforts related to technology experimentation. Although they came up on multiple occasions in our discussions, there was likewise no overwhelming evidence that these departmental influences ultimately create a real effect on his attitudes or efforts innovating with technology.

Money

It is important to note that the topic of money in the form of compensation did not come up in anywhere in the data with Allen. On the other hand, he did describe ways in which funding to support campus-wide support programs served a motivational role in his efforts with technology:

> And so there was a chance…this would be recognition for what I'm doing with my students…I knew at the time it provided extra funds to do things like this…They talked about how there might be a little money to do things and so…That was good because then we can try different things. So…it was exciting to do different things because I knew the students would get excited over it…non-traditional stuff. And so for that reason it was; it was a chance to do something

different…You and me…invest…all these extra funds…because all along, you guys have given me the support to do this.

Coming Up with New Ideas

One relevant piece of the motivational puzzle of Allen is to understand the process by which he comes up with new technology ideas to pursue. A significant part of the overall effort in implementing a new technology is deciding on which one to pursue. It seems that in the case of Allen, his discovery phase is clearly non-purposeful or even somewhat serendipitous. And when it comes to setting aside specific time and attention to come up with new ideas he described to me a process that is somewhat random in nature and relies largely on "aha" moments or happenchance experiences. For example when I asked him to describe the typical experience of coming up with new ideas and capturing them, he responded with this:

> Oh, I write them down…I've got a little pad of paper…once in a while I'll think of a way to tweak something in class. I think once you find something that will take that next step—once I identify that 60-80 thing, that's what does it…It just kind of happens…I don't sit down and I think about something.

And while he may be non-structured in coming up with specific new things to try, he is still conscious of establishing a safety zone of experimentation. In other words, he does not want to push the envelope of innovation into a region of great risk for failure. He wants to be out ahead of most others, not in a way that puts him or his students at risk. He expressed this approach clearly when he described positioning himself along an imaginary continuum of relative innovation:

> If you look at it like zero is way behind, a hundred is at the forefront, I'd think the sweet spot to me is between 70 and 80. You're not at the forefront. Well, because one in five things kill you or one in five things make it. Let's say between 80 and 100. Between 60 and 80, four or five things will make it. I'm not just going to try stuff. I'm going to watch it a little while. Figure out what's going to work then take a bet. I'm not going to gamble everything on something that's just out there.

Here he is describing both his need to balance his inner desire to differentiate but not in a cavalier way or that has an undue risk of failure. Allen is assertive and competitive, but he is equally conscious of doing things correctly and maximizing the odds of success.

Classroom Observations

I was able to participate in three separate classroom observations of Allen with all of them representing different sections and courses. One of the sessions was in the spring semester and the other two took place in the fall. All of them were conducted in a traditional face-to-face classroom setting. In spite of their traditional format, all three were heavily dependent upon technology for both content delivery and in-class activities. Allen tends to include a significant online component to all of his classes as well using the centrally-support campus learning management system. Attending a class taught by Allen is very much like having a private conversation with him about his teaching or research. Two things dominate both experiences: a high level of energy and enthusiasm were accompanied by a thorough infusion of technology.

Another attribute I observed about Allen's teaching activity was a high degree of precision. He was very precise about the specific class sessions I was to observe, he

provided me with very precise instructions on location and time of the sessions, he prepared me thoroughly beforehand by sending me digital copies of all the material he would be using in each of the sessions, and he provided the students with very precise instructions in both the syllabus and classroom activities.

His heavy use of technology was evident throughout the teaching events and for Allen, I came to believe that technology is not simply a means of delivering content to the students; rather it is deeply integrated into the course content and experience. Two good illustrations of the strong relationship between technology and content in Allen's teaching are in figures 2 and 3. The first example (Syllabus Artifact from Reflecting Extensive Use of Internet for Content) is a lengthy and detailed list of a prescribed websites that are in the syllabus as formal parts of the course content. The second example (Syllabus Artifact from Course with Extensive Technology Language) is also drawn from a course syllabus taught by Allen and is a sample of what he considers a good discussion posting. As you will notice, even his examples are infused with technology terms.

Website Listing
hotnewsresource.com
internetmktgnet.org
hotbusiness.com
marketing.com
hotmarketing.com
marketing-online.com
internetupgrade.com
TIA.org
IMdailynews.com
IMmarketing.org
hotnewsmag.com
IM-industry.com
lhonline.com
breakingnews.com
4marketers.com
IMtrade.com
internetmag.com

Figure 2. Syllabus Artifact from Reflecting Extensive Use of Internet for Content

Discussion Examples

In response to Mr. Bell's comment, to say "technology is almost never a bad thing" is, at best, silly. Technology is neutral; technology's character as good or bad is determined by its use. The same e-mail networks which foster speedy and agile communications between employees in the course of their jobs can just as easily be used for purposes of threats, sexual harassment, and racial discrimination. This is, of course, in addition to the much more mundane use of company assets for personal enjoyment or even personal business (for example, day trading on company time during the stock market's healthier days). When surveyed, the majority of companies queried responded that they monitor personal use of internet and e-mail privileges and have more than infrequently identified use of the internet for illegal or immoral activities. Another author reports that e-mail has become the communication channel of choice for organizational politics, including clandestine communications and developing power coalitions—both for good and evil purposes. To reiterate, technology has both positive and negative implications for workplace communications but certainly is not "almost never a bad thing". Similar to technologically advanced nuclear fission, great energy can be generated for the common good but alternatively, it can used to build a bomb capable of great evil.

Figure 3. Syllabus Artifact from Course with Extensive Technology Language

It is important to note that these two exhibits are not anomalies; instead they are typical of Allen's style of course construction. The extensive level to which he integrates technology into the classroom experience was very evident in all three of the observation sessions. Specific examples of technologies I noted in these sessions included frequent use of digital presentation technology (projectors and PowerPoint), in-class laptop-based exercises by the students, accessing social networking sites such as YouTube or MySpace, and student-produced digital movies. The use of technology terms also peppered his classroom dialog. During one session, I noted the use of these terms alone: blogs, personal blogs, YouTube, tags, pop-ups, viral-videos, and blogsphere. While none of these terms are particularly unique in the full realm of modern 'tech-speak' they are probably not often used in such density in the average college classroom.

While I did not pick up anything especially new from these classroom observations, they helped confirm many of the things I learned about Allen through the interview process.

Summary on Allen Williams

While a lot of interesting themes emerged from my time with Allen that helped greatly in better understanding why he invests so much in his exploration with new technologies, one thing that did seemed clear is that he is largely internally driven in his efforts. Strong reinforcement of the value of this effort appears to come from the students' reaction to his efforts and the power of networking with like-minded colleagues gives him direction on specific choices of new technologies to pursue. The roles of campus administration and organizational culture (local or institutional) provided

interesting supporting roles towards his attitudes, but do not appear to exert a real net affect on what Allen actually chooses to do in his teaching.

The Story of Amy Curry (Case Study 2)

> I'm always interested in learning about what's new out there. I think since I've started teaching. I look for ways to improve my teaching. So, in the past five years, the technology to do that has dramatically increased. I also do look at…just pedagogical ways that may or may not involve technology to improve teaching. But I don't think…those don't hit me in the face as readily as the technology ones. I think for the most part motivation comes also comes from "will it help me in my teachings? Will it benefit the student?"

Amy Curry is a recently tenured Associate Professor of Engineering at the University of Memphis. She is in her 7th year as a faculty member at the university and earned her tenure two years prior to this study. Somewhat noteworthy is the fact that Amy is one of two female faculty members in her department and in a discipline that historically male-dominated. Amy is also unusual in that she earned all three of her degrees (undergraduate, masters, and doctorate) at the University of Memphis. Thus for Amy, the engineering school where she teaches has been her intellectual home for a very long time.

As will be seen in the following discussion about Amy, a good part of her professional success within her department stems from her expertise with technology, both in her teaching as well as her research. Like the other three case participants in this study, she has been able to balance her strong personal interest in technology and teaching with an acceptable level of scholarly activity to meet the demands of a research-

oriented department. What will also be seen in this discussion about Amy is the central role played by her dedication to teaching and learning, her sense of duty to her students—and how those two issues influence her innovation efforts with technology.

Individual interviews with Amy were in her personal office—the clean and orderly appearance of which reminded me of her knack for preparation and clarity that came out in our interviews and classroom observations. Everything about my time with Amy was consistent with the behavior of an engineering professional: thorough planning and preparation, a neat and orderly appearance, and cleanly executed teaching activities.

Orientation for Student Success

The most notable observation about Amy from this study is the degree to which she focuses on student needs. This was revealed very clearly during one of our interviews when I posed the question "What do you like most about your work at the university?" and her reply was direct and quick: "Working with the students…whether in the classroom [or] in the lab. That's what I enjoy." Another very good example of her commitment to her students came in a later interview when I asked her to recall a particularly good or bad experience. The first thing that came to her mind was a summer teaching program for high school girls she was in charge of that she felt short of her personal expectations and that "…my perception of how it went was not good…I feel like it didn't meet my expectations for what I wanted the experience to be." Through these kinds of stories, Amy exposed a strong inner focus on the needs of her students.

She provided some evidence regarding the source of this strong sense of duty and empathy for her students when she talked about her own challenges as an undergraduate student telling me that "…as a student I usually felt lost [and] I know there are students

[in my classes] who still feel lost. So that is a little bit of a concern for me…" In another interview, she provided a example of how she consciously considers the individual learning styles of all her students in this statement:

> "…but you know—learning styles—some students are able to dive right in and just work on it quickly. But I think some people, they just need more time to sit and think—however they process information—starting a new problem. I'm sure some people, that's just not their style—to just dive right in…You want to design your class so you can at least hit them all…somehow.

I came to learn that Amy did not always see herself as being so strongly connected to the teaching role telling me that she did not always see herself as caring so much about teaching in her early years as an academic professional. For example, when I asked her if her attitude about teaching had changed from her pre-tenure days she replied:

> It could have been more towards research. I think at that time I didn't know that I enjoyed teaching. I hadn't gotten to the point of really enjoying it because I didn't have enough experience at it. [Over time] I looked at it like starting a new job.

As I will show later in this discussion about Amy, her attitude towards student success is consistent with a departmental culture that emphasizes retention and graduation of students.

Student Feedback

Amy perhaps best illustrates among the four study participants the strength of student feedback as a source of positive motivation to innovate with technology. In a number of circumstances she described how the reaction of her students to her experiments with technology was very fundamental to her continued efforts to do more

(or less) of it. Considered along with her strong dedication to students in general, it is not surprising that their reactions (feedback) would play a significant role in among the entire set of motivational influences she experiences.

Good illustrations of how student feedback function to shape her attitudes regarding experimentation with technology came out on several occasions. For example, in one interview I talked with her about why she pursued certain new instructional technologies and she offered several statements that illustrate how her decisions regarding experiments clearly centered on the learning impact for her students.

> It's kind of the immediate feedback I get from them I can usually tell: "Yeah, this looks like it's working."
>
> If I can make a direct link where I can see where this might help some issue that I have in teaching then probably highly motivated to try it. But when there's something that I feel there is a deficit in learning, meeting a learning objective, or meeting this other soft skill, whatever it is, when that really, that's the more motivating thing. The deficit that I was filling with the wiki was keeping the students on task. Helping them to not wait until the end of the semester to put the whole thing together. Because, right now with the wiki, they've basically got everything done. They just need to package it in an oral presentation format. But, as I see it right now, I think I would use it again. Absolutely. There's a clear benefit here that I've seen. It will just make it, make me sing its praises even more to other people that might do similar things for their classes.
>
> More of "does it actually increase engagement?" With the students? That's the kind of thing I felt…OK, maybe this will make those students that are very

> passive in class, engage more and become more of an active learner, cause they might actually sit and think about the problem if they know they have to put in the answer.

A Cautious Approach

Very much like the other participants included in this study Amy expressed on several occasions a personal fascination with technology, although to a lesser degree. But Amy does not let simple fascination take over as a primary source of motivation. Instead, she is a bit more cautious in her approach towards identifying and trying out new technologies in the classroom. In fact, she seemed to be the most careful and cautious among the four cases in this study.

As she pointed out in several instances, her first goal is to remain within her comfort zone with anything new that she tries. A good illustration of this cautious approach came out when she described how she arrived at the decision to use wiki technology in one of her classes:

> …if it fits within my comfort zone—like a wiki—it's an interactive webpage. When we start talking about like social networking that is outside my personal…comfort zone. I don't do social networking… But at the same time, it's outside my personal comfort level so that gets lower on my list than a wiki.

What might be surprising to her departmental colleagues is Amy's belief that she does not push the envelope on experiments with new technologies. Rather, she takes what might be considered an engineer's practical and planned approach where anything new has to show concrete evidence of supporting student needs. Likewise, she is not hesitant to terminate something that doesn't pass an internal learning ROI that she maintains on

all technology experiments. The following block of dialog came from a discussion about her initial use of a wiki and provides a useful illustration of the cautious, positive-return attitude she takes towards all new ideas:

> I think it was a good return on that effort. Certainly like anything new there's the learning curve of just figuring out how it works. How you want to organize it…to frame it…to present it to students…but, overall, a positive experience. I think about the positive things I said before. I'm giving them more and probably better feedback than the methods I used before. But when there's something that I feel there is a deficit in learning, meeting a learning objective, or meeting this other soft skill, whatever it is, then that really, that's the more motivating thing. The deficit that I was filling with the wiki was keeping the students on task. Helping them to not wait until the end of the semester to put the whole thing together. But, as I see it right now, I think I would use it again. There's a clear benefit here that I've seen. It will just…make me sing its praises even more to other people that might do similar things for their classes.

While she expressed on several occasions concern over taking risks with her lower-division students, she expressed a more willing attitude to take chances with her upper division students. She may be more willing to take these risks with her upper-division students because there are more experienced academically and are more likely to be resilient students. She clearly illustrated this varying approach towards risk among her students in the passage from one of our interviews:

> Usually not…I'm usually not willing to take a huge risk in the classroom—especially with freshman…I'll do that more in upper division. I'll try. "I think this

might be a good example problem to talk about." And usually, since it is an upper level class, usually there's lots of ways to go about solving the problem.

Her approach towards risk management is further illustration of how she keeps student-success at the center of all her teaching technique decisions. In other words, experimentation and innovation is an important part of her personality, but not at the expense of student success.

Another point of consideration regarding Amy's overall approach towards experimenting with new techniques is the process she uses to identify specific technologies to try. Like the others in this study, her approach towards the identification of things to try is not the result of a structured and planned sequence of activities. Instead it is more a by-product of a variety of small independent moments that do not fit a regular pattern.

> So there might be things out there, I want to go check out, but a lot of times that gets put in the back burner. Like social networking and stuff…I'm just…Like I said, that was one of my personal…I'm scared of that…outside of my comfort zone…so that's like "Oh yeah, I'll try that some day. Maybe I'll try that someday." I guess experimentation—meaning that "just try it and see if it works." One day it would be "oh, I got this free hour" because there's not a burning deadline and so I'll do it. So, that's kind of one reason I say I'm not structured. I don't block that time. OK. What's due next? What's the time I have to do it? Is that going to fit in or not? And they fall in and I work on them when I have some—I have more freedom.

After such experiments, however, she follows up with a conscious effort to evaluate its value to student learning and its consistency with her teaching style.

> Certainly I go back at some point after the course is over do a reflection. Kind of have a departmental process of assessing our courses with each faculty that teach. A little narrative and kind of rate how students did on our learning objectives and make suggestions for changes—if any—needed. So there's that kind of immediate thing for me. But then at some point I do reflect on the whole course.

Her overall approach towards making decisions about what to try next were captured well when she reflected on her teaching choices this way:

> I don't know about always; I think since I've started teaching. I look for ways to improve my teaching. So, in the past five years, the technology to do that has dramatically increased. I also do look at…just pedagogical ways that may or may not involve technology to improve teaching. But I don't think…those don't hit me in the face as readily as the technology ones. I don't know, since it was on campus and easily accessible, that would have been just enough. I think I would have the same motivation to go. But I don't spend time reading the education journals, say in engineering, for instance.

Departmental Culture

Based on the data collected in this study, Amy's department appears to place a high value on student success. According to her department chair, this attitude is built into their departmental goals, supported by their departmental leadership, and directly measured as part of the program review process of individual faculty and is reinforced open discussion within the department. They have turned student success into a systemic

process that is tightly woven into the way they do business. For example, her department chair told me they include a formal process of evaluating learning outcomes as a part of each academic year.

Evidence of a strong student-centric orientation was reflected in conversation with both Amy and her department chair on multiple occasions. Relevant to the goals of this study, pushing technology as a means to achieve student success is not a part of their approach. In other words, while the culture of her department is clearly oriented towards student success, there is very little overt effort to influence how you accomplish it. Amy expressed this hands-off attitude most succinctly by describing the attitude of her department this way: "…There's not an influence on how you teach. There is an influence of effective teaching."

And while the department chair is very clear in his perception that innovation with technology is extremely important in this department ("…I always put it very high up…"), he is equally clear that his style is not to push it directly on the faculty ("…I haven't pushed it hard at all…"). He also described being willing to fund new technology-centric efforts when proposals are brought forward ("…If somebody came to me and said I could this if we found some money, I'd help them find it. I rely on their desire to do it…")

There were other illustrations of the generally positive reception of her department towards innovation with technology. For example when I asked her department chair to name a person in his department who stood out in his mind as being an effective user of technology he used very positive language in identifying Amy as the individual who best fit that description: "In my mind the person who fits that best is

Amy. She's a leader." Two other good illustrations of her department's supportive environment towards technology innovation that came out in the interview process were as its early adoption of student clicker technology and its decision to locally-fund fully-equipped computer classrooms. All of such initiatives required top-down endorsement from departmental leadership.

In spite of all this evidence presenting a departmental culture that is supportive of teaching success and technology innovation there is also nothing in the evidence to suggest that the departmental culture fundamentally impacts the predisposition of Amy to innovate at a higher level than her peers. Put more simply, there is no evidence that this departmental culture materially impacts Amy's natural curiosity with technology. Thus while the local culture clears away roadblocks and provides resources, it also does not appear to exhibit a strong influence on her basic internal drivers.

Campus Culture

The influence of campus culture on Amy's level of activity with technology is primarily represented through her utilization of campus-wide resources that support and sustain the use of instructional technologies. Examples evident in the data of her use of these campus-provided resources include: (1) her participation in a technology fellowship program supported by the campus, (2) multiple instances of her discussing the value she places on faculty support resources provided by the campus, and (3) observations from her department chair regarding the value of institutionally-funded technology classroom configurations.

For example, when I asked about her level of activity with technology if the faculty support center no longer existed, she replied:

> I think it probably would decrease, could decrease my use of technology and the new technology. Just because I may not have an easy access to it. Having someone on campus that you can call is…that's easy access. But if I have to go out and find my own resources whether it would be a colleague, which could be a good resource, but you have to know which colleague has what knowledge.

And continuing that conversation, she described very directly how the campus helps her this way: "From my perspective the influence they're had is, by creating the Advanced Learning Center and the services that you provide [and] investing in campus-wide technology such as eCourseware."

Within her local academic unit, her department chair expressed his perception of the value of campus resources towards faculty innovation with technology when he noted that it is a "…very good thing the campus is doing is providing this kind of uniform arrangement inside the classroom…computer that's ready that connects to umdrive…" as well as the value of a campus-supported fellowship program she attended when he observed "…that's part of where she got the skills built up. I think that's a part of the learning curve that's necessary."

Networking with Colleagues

As previously described, for Amy, discovering new technologies to try is not something she does in a planned or purposeful way. Her new ideas generally come out of serendipitous events, not pre-planned or scheduled research time. Yet in spite of her unstructured approach, she is able to maintain a steady flow of new ideas. One of the more powerful influences on her discovery process is the variety of teaching and technology networking events she includes in her schedule on a regular basis. An

example of how she uses these networking events to generate new ideas was when she described coming up with the idea to use wiki technology in her class:

> I had started hearing about Wiki's and saw the Wiki that the University of Memphis has. So my motivation was…learning about the Wiki technology and then also how to meet in a classroom and finally…saw some examples of other people that had done team projects in a classroom setting...at that conference this summer you guys held with the ALC.

Amy seeks out both formal and informal settings to engage with others in technology-oriented conversations. A good example of the formal settings was her participation in the technology fellowship program, while an example of her using informal settings was her attendance at interdisciplinary special interest discussions on social networking tools.

There was also evidence of Amy using a networking approach within her department to influence others. Her department chair described an example of her influence with a colleague this way: "…and when you see [her] teach him how to use this equipment you see cross-pollination across the department. Amy really helped [him] come on to technology. She is in particular is very good this way."

An interesting anecdote regarding the value of networking and support groups to support technology innovation came from the interview with Amy's department chair when he described the importance of informal networks and coalitions as a means of facilitating knowledge transfer and confidence for new technologies. A good example he cited was the importance of PC user groups in the 1980s drawing a parallel to the adoption of learning technologies by faculty in the 21st century. I found his observations

significant and potentially relevant in explaining the apparent value of peer networking for the participants in this study. There may be similar experiences among early adopters of technology within the faculty population.

Balance / Career Stage

At the time of this study, Amy was in the early post-tenure period of her career having achieved tenure approximately two years before. Being in a post-tenure situation, she therefore generally has reduced pressures in certain areas of her work and is enjoying increased professional autonomy as a faculty member. On the other hand, research productivity expectations remain a big part of job, especially as she looks forward to tenure and promotion opportunities in the future. This is particularly important in a department like engineering where grant-production and publication output are primary measures of professional achievement. In this light, the question I wanted to explore was how Amy approaches her high interest and motivation to explore teaching technologies while at the same time maintaining an equally high level of research production. What I ultimately discovered is that Amy has been able to consistently balance both.

At several times in our conversations, she gave evidence of her self-awareness of the pull of these dueling expectations. For example, she noted that her additional efforts using technology sometimes eats into other areas of her job resulting in "getting dinged" during her annual reviews for "needing a few more papers." On the other hand, she apparently still enjoys a healthy and supportive overall reputation as perceived by her department chair. A telling point came when her chair observed to me that Amy would likely continue to succeed professionally precisely because of her exceptional aptitude

with technology and her ability to consistently leverage it at a high level both in her research as well as in her teaching:

> I have a suspicion that I will retire before she becomes a full professor, [but] their decision is going to be made because she succeeds in using technology both in her research and in her teaching. She can do both and I think that's why she will succeed.

Her chair also pointed out that in the field of engineering "…the best teachers get the best graduate students…" which is vital to maintaining a healthy level of research output. In Amy's department there seems to be a cooperative interaction between the teaching and research activity of faculty members. When considered along with her department's generally supportive attitude regarding student success, her high level of investment in teaching and technology appears to not be incompatible with research output and overall professional success in her department.

In considering the matter of professional balance, it is relevant to note that the point at which Amy achieved tenure was during a period of heightened focus and pressure on her campus level regarding research productivity, external funding, and increased national reputation as a research-intensive institution. And yet, throughout that time, Amy was able to excel as a technology innovator, strengthen her teaching skills, maintain a necessary level of scholarly output, and still achieve tenure. Based on the evidence collected in this study, Amy appears to be able to maintain a healthy balance.

Age

Over the course of my private time with Amy there was a series of mixed signals regarding a possible influence of age on her overall potential to innovate with technology.

She even noted the ambiguity of this issue herself when she pointed out that within her department "…I'm next to youngest…So if there's a correlation there, I don't know." Approaching the age of 40 does not put her into a demographic category that is generally considered to be part of the technology generation. On the other hand, relative to many of her late-career peers, she is clearly not old enough to be casually categorized as "too old" to be drawn to technology.

Her chairman (who is a bit older than Amy) weighed in on the question of age and its potential influence on her by suggesting that "…because she's a member of the technology generation, she thinks about [technology]. Because she's younger, she will learn more and do more." He complicated things further by throwing in the potential impact of her teenage son: "I don't know the extent to which it helps that Amy has a son—Cole—who is about 15 or 16. I wouldn't be at all surprised to find there is a little bit of shared technology from there." It seems clear that her department chair perceives Amy to be a member of the technology age which he believes has impacted her level of activity with it in the classroom. On the other hand, Amy does not see herself in the same light.

As a researcher, it was difficult for me to know what to draw from these mixed perceptions regarding age and Amy's propensity to use technology. Is she a part of the technology generation? Is she not? Does anything about her case data suggest a strong connection between her age and the way she approaches technology? Based on this data, the only thing I feel comfortable suggesting is that nothing about Amy's story provides evidence of a strong correlation between age and motivation to experiment with technology.

Gender

Much like age, the analysis of Amy's data did not provide anything clear-cut to suggest a hard relationship between gender and overall motivation to explore technologies. However, as I observed with the other female participant in this study, there was some evidence in the data gathered that hints of female faculty members exhibiting a more nurturing relationship with their students when compared with their male counterparts. Where the men seemed to be influenced by competition and differentiation, the women reported a more consistent attention to student needs as a source of motivation to explore new technologies. However, the evidence from this study regarding a gender difference is not strong enough to do any more than note its potential and suggest it for possible future additional research.

Money

The role of money and Amy's perception of its relative importance to her came up on several occasions over the course of the data collection. Consistent with the other participants in this study, nothing came out in my time with Amy to suggest that money in the form of direct compensation plays a tangible role in affecting her behavior and attitude towards innovating with technology. In fact, Amy was relatively clear on the non-effect money has on the way she approaches her professional responsibilities. On one occasion she discussed the very minimal influence of compensation on her choice to be an engineering faculty member when she noted this about money:

> ...it's important, but as an engineer I feel fairly confident that if my academic career didn't work out for whatever reason—I could go to work in industry. So financially, it's not that important to me. If financial security were important to

me, I would have gone straight into industry…I would make more money—presumably—in industry than in academic[s].

However, the role of money with Amy's level of activity is different when looked at as a resource for the acquisition of technology tools used in teaching innovation. Her department chair discussed the role of money in that capacity on several occasions describing his department as not being on "a pot of gold campus" and noting that when he has discretionary money to spend "…it's understood if you're going to use something…that's going to influence and increase the quality of education for the engineering courses you teach, that's what the money is supposed to be for…"

Classroom Observations

My observations of the teaching activities of Amy occurred in both the spring and fall semesters of 2009. I attended three face-to-face class sessions and was also given access to the corresponding online course areas as well. Probably the most significant observation to come from studying her teaching activities is her extensive use of technology throughout the entire experience. This was not surprised based what I had learned through the selection process that included her in the study group along with what I had gained through the interview process.

She relies heavily on the campus learning management system (LMS) for many aspects of her classes and also makes extensive use of the other available instructional technologies provided by the campus and her department. Specific examples of instructional technologies I observed being used included laptop-based in-class exercises, student 'clicker' units, and the campus wiki. While none of these technologies is particularly unique when considered on its own, I found interesting the extent to which

Amy uses such a wide variety of resources and has so thoroughly integrated them into her curriculum. The average faculty member would find using any single one of these to be a significant expansion into innovation. She is able to effectively and comfortably use them all.

It seems evident from watching Amy conduct her teaching activities that she enjoys being in the classroom with her students and interacting with them. She arrives early, is dressed professionally, and is very organized and well prepared. A good illustration of her level of preparedness was when I noted that her PowerPoint slides included the actual class date in the footer of every slide.

Her style is not to stand at the front of the room and simply lecture. Instead, as I observed in all three sessions, she is more apt to roam around the room and interact with the students both individually and collectively. She may even deliver a piece of the lecture from the back of the room depending upon the dynamics of the moment. Calling out students by their first name is common even though there are 25 students and it is very early in the semester. Smiling and laughter are also common.

Yet at the same time, her classes are purposeful and engaged around the carefully-planned content and in-class exercises she has lined up for the day. What was particularly fascinating to me was to observe how cleanly she has woven the various technologies into the entire experience. I observed no technical glitches or frustrated students. Her degree of competence with technology and proper preparation was apparent throughout. Another indication of her competence with technology was her regular inclusion of technology terms throughout the classroom dialog. Technical terms such as PDF, wiki, HTML, and UMdrive were likely to be tossed in right alongside engineering terms.

I also had the opportunity to observe Amy's ability to innovate in the class using thoroughly non-technology tools. A good example of this was when she conducted a classroom brainstorming exercise involving all 35 students and completed it using only a combination of sticky-pads, marker pens, and flipchart paper. This was additional evidence of her picking what is right for student learning independent of the format.

Her use of the online classroom space with the campus LMS seems to function as a continuation of how she uses the physical classroom space. She uses it to communicate with her students and has it well-integrated with what is going on in the classroom. In exploring her use of the LMS space, I found that she uses most of the available tools beyond email including a news areas, digital drop-boxes for posting assignments, and the online grade-book. She has also incorporated the campus wiki for group projects.

During the classroom observations, I became conscious of how the very nature of the engineering discipline is inherently tied to technology at many levels. Thus, it is not entirely surprising that a biomedical engineering class would naturally include a technology-centric theme. At some level it is possible that her discipline itself functions to develop her technology-orientation. On the other hand, I learned from her department chair that many of her engineering colleagues as just as apt to avoid technology entirely.

My conclusion about Amy's use of technology in class based on these observations is that it is so well-honed and integrated into the overall learning experience that the technology components are virtually indistinguishable from the class experience as a whole. If you were not paying close attention, you might not even make note of her many uses of technology. None of this is surprising based on what I learned of her in the interview process.

Summary on Amy Curry

Among the four case participants in this study, my observation is that Amy is perhaps the most accomplished at integrating a variety of technologies into her classes. In fact, what I observed in the classroom and in her online courses in terms of technology use seemed to exceed what she described during our interviews. She seems comfortable and self-confident in her approaches and meeting student needs are always central to her actions. And while her department is very receptive to things that support student success and does not discourage her use of technology, neither does it appear to materially impact her attitude regarding teaching. Her rationale to invest in technology is primarily anchored in a strong desire to be an effective teacher—all other factors are secondary.

The Story of Michael Gootzeit (Case Study 3)

> …any time I saw something new that I could use, I wanted to try it. Well, I [see] the new technology as a puzzle. And the challenge is to understand…and try to solve the puzzle. That's why it is a challenge. That's what I like about them.

Michael Gootzeit is a full professor in the department of Economics within the Business College on the University of Memphis campus. He has been with the university for over 30 years, having achieved tenure in the early 1980s. He earned his full professorship in the 1990s. Over that time, Michael has taught hundreds of class sections and exposed many thousands of undergraduate students to economic theory.

In spite of his length of time at the same institution, the inquisitiveness and curiosity that Michael brings to his teaching responsibilities does not appear to have diminished—at least as represented by his propensity to experiment with new uses of technology in the classroom. As I will share in the following analysis of my discussions

with Michael, you will see how his approach towards teaching and innovation directly embraces the central theme of this study: that a variety of intrinsic drivers function to keep this veteran in the classroom continually exploring new avenues for teaching and continually innovating with technology. This high level of investment in teaching occurs with Michael in spite of his receiving little to no support or encouragement from his department or little in the way professional reward. He seems to find using technology interesting and pursues it vigorously.

As I looked back on my interviews with Michael and what he shared in our conversations, it appears that he represents a contradiction to many common assumptions about faculty attitudes and capabilities connected to age, career level, and professional reward related to technology and teaching effort. His intrinsically-driven propensity to invest in above-average use of instructional technologies continues in spite of his age, career-stage, and the general lack of professional reward. Michael may even be considered the poster child of that phenomenon, which is central to this study.

Context of Interviews and Observations

Other than the interviews with his department chair, all of the data collection for Michael's case study occurred in one of two places: (1) his private office in the business college faculty building or (2) the large lecture hall in the classroom building where I had the opportunity to observe his teaching activities.

His Office

The one-on-one interviews with Michael all took place in his private on-campus office, a compact room overlooking the courtyard of the business school complex. Sitting in Michael's office for a conversation is an experience that conjures up a movie-set image

of the inquisitive professor. Every available surface (guest chair included) is stacked high with papers, articles, books, and the occasional technology gadget. Settling into his office for a visit requires a bit of navigation just to find—or create—a suitable place to sit or to park a cup of coffee. In spite of the somewhat busy and crowded nature of his private space, you also feel that every item in the room is there for a specific reason. You sense he has some type of effective store-and-retrieval method to find what he needs in the room.

My theory about his use of space was confirmed on several occasions during our interviews when he would retrieve from a crowded shelf or tilting stack of papers very specific items that helped him illustrate a point in our discussion. Sometimes these items represented his interest in technology—such as a box of reel audio tapes from the 1970s—while others were more low-tech such as student note cards with personalized artwork that he had retained from semesters far in the past. A central theme to Michael's use of space in his office was the way in which it seemed to represent his strong interest in connecting with his students along with a long-term curiosity about technology and its place in the learning process.

His Teaching Activities

Michael's current teaching responsibilities involve a heavy load of lower-division economic theory in class sections with enrollments of anywhere from 75-100 students. Many of his students are also first generation college students which presents additional challenges for him as an instructor. As he shared with me on several occasions, Michael sees an expanded role of his teaching responsibilities beyond conveying basic economic theory alone. He shared with me his concerns about what he believes are growing

inadequacies of many high schools to properly intellectually stimulate and prepare students for success at the college level. To attempt to overcome these shortcomings, he consciously peppers his classes with a variety of anecdotes, intellectual challenges, and other techniques that he uses to better engage them in the class content and also to spur their intellectual development. Over the years, he has found that emerging technologies are an effective resource to assist him in these curricular and co-curricular activities.

In order to capture the full picture of Michael's classes, my data collection included both the physical classroom in the form of observations and the virtual (online) classroom space he maintains for all of his classes. In the following sections I will share with you the various themes and observations I derived from my time investigating Michael.

Personal Curiosity

The thing that stood out the most to me regarding Michael was the degree of personal curiosity he brings to his teaching work—particularly as it relates to instructional uses of emerging technology. He talked continually of how he found this "interesting" or that "interesting" and of the many ways in which he explores his curiosity about new devices and technologies as a part of his teaching. As I also discovered on a number of occasions, his tendency to be curious is not limited to technology and teaching. In general though, our conversations were most frequently centered on the theme of technology in the classroom.

The term interesting was so commonplace in our conversations that I calculated the frequency of the word "interest" and its variants (interested, interesting, etc.) and calculated that they appeared at least 52 times in the transcript of Michael's dialog.

Numerous examples of his inquisitiveness with technology came out in our conversations alongside the related issue of his desire to avoid boredom through these exploratory activities, including the following examples:

> And I thought that would be interesting. And I was bored with the usual thing of just having students just take notes and lecturing without any visual aids so I thought it would be interesting to use more modern things and I was always interested in computers anyway…The first time I saw them, I was very interested in…personal computers.
>
> I was always interested in how it worked. I was curious about it. I thought it was a puzzle. A little puzzle that could be solved. To figure it out. I liked that…

What seems evident from all of this is how exploring technology and its use in teaching functions as a steady source of intellectual challenge for Michael and how it helps him to avoid boredom. It also addresses his penchant for constant curiosity. As a source of intrinsic motivation, the connection of technology, teaching, and curiosity appears to be a strong source of support for Michael's persistently high level of teaching innovation.

The mechanism by which technology addresses Michael's dual needs related to intellectual curiosity and avoiding boredom was perhaps most succinctly represented in his observation that "…it gives me more creative energy, because I don't want the class to be dull."

All Things Technological

Another facet to Michael's overall motivation is his very obvious interest in what I refer to as "all things technological." Distinct within his overall level of intellectual curiosity is a strong interest in the evolving nature of technology itself. Supporting this observation about Michael are the many examples of his technological interest going back many years that came out of our conversations. He exhibited a strong persistence to explore and experiment with emerging technologies over an extended period of time. That is to say Michael is not a recent convert.

Good examples of past activities include his use of analog recording technology in the 1970s to capture lecture notes as well as his efforts with radio broadcasts as teaching tools in the 1980s and 90s. He seemed proud to tell me of being one of the first faculty members in the college to explore personal computers, the internet, and email when as they appeared: "…and then when they started getting the Internet…that's when I really started getting interested in it. I started using email. And I saw the potential of that." His long-term interest in being a first-user of new technologies has significance in this study as illustrating the strong internal drivers that affect his behavior.

A specific example of his long-term interest in the overlap of technology and teaching was when he pointed to a box of magnetic audio tapes that contained recorded examples of his lectures from decades in the past and wishing he could listen to them again because "I really liked what I was doing." Another good example of his attitude of early adoption came out in our first interview when he shared with me his efforts to provide economics lessons via public radio broadcast in the 1990s. He was particularly pleased with the results of the radio broadcast lectures by excitedly telling me it had

"…reached everybody…" in the intended audience. In more recent years his experimentations have included paperless testing using wireless PDAs, computer-based online assessment, and extensive use of the internet for research and general class management.

Rather than wait for others to come up with new applications of technology in teaching, Michael invents new approaches by making connections that others miss. In short, he is not only an early adopter of new technology tools, he is also a creator of new approaches which he then turns around and uses. A good example of his exploratory attitude was evident during his expression of irritation regarding the slow adoption of cell phone technology as a tool for classroom interactivity:

> And, when you see people using that sort of thing all the time and it also uses the internet, then you think to yourself well, we've got people using that and then you see people using computers. That's one of the things that have not taken place as much as it should. To use a cell phone as an instrument in the class to help the information proceed.

The combined factors of his ongoing and general curiosity about many things and a specific long-term interest in exploring emerging technologies help to illustrate why Michael behaves the way he does and perhaps why he ended up in this study.

Tolerance for Failure (or Persistence)

A repeating theme in this study is the tolerance for failure (or resiliency) as shown by all of the case participants including Michael. Anyone who has worked with emerging technologies as long as Michael has will have likely experienced a failed experiment. He described on several occasions new ideas he pursued that fell short of what he wanted

resulting in student complaints and lost learning opportunities. He also expressed frustration at often having to "redo a lot of stuff" and "wasting time" on technologies that are "not adapted to modern things." It seems that with Michael, even the most contemporary technologies will not make it into his classroom if they fail a requirement to address his vision of 21st century learning while remaining practical to implement.

Yet such failures present little or no apparent deterrence to his continued efforts or overall attitude regarding technology. Instead, these failures appear to function mostly as learning experiences from which new ideas are developed. For example, he talked of being "…very adapted to risk…" and that he "…likes the risk actually…" perhaps even enjoys it. In one of our interviews, he expressed his high degree of resiliency succinctly by stating that "…even if I had more failures, it wouldn't matter. I'd still keep trying."

While it is not clear that resilience or tolerance to failure functions as a positive motivator, it certainly helps serve to mitigate impediments to his level of innovative behavior. The net effect of his persistence through repeated failure is to apparently facilitate higher levels of innovation than he would have without this level of tolerance.

Ultimately Practical

Another characteristic that Michael shares with the others in this study is the practical way in which he approaches his exploratory work with new technology. Just because he chooses to try a new approach and puts significant effort into making it work, it is not a foregone conclusion that he will actually use it with students or retain it for use in the future. To this end, there are two broad criteria he considers from a practicality standpoint when considering a new technology: (1) Will it serve the learning needs of his

students? And (2) is it technically feasible to employ in his teaching situations? If the new idea fails either test, he is likely to drop it.

One good example of his need to relate technology to student learning came when we discussed the reason he repeatedly applied for funding through a campus grant program related to technology in the classroom. The primary reason he continued to pursue funding was because he "…was still very interested in how it could improve the students' learning as fast as possible..." Later when he was describing to me his long-term interest in technology he noted that "…over those 41 years, at some point a threshold got crossed where suddenly technology…presented an opportunity to change things that go on in a classroom."

Another example of his willingness to drop innovations that he deems impractical came out in while we were discussing his attempts to us student response technology ("clickers") in large lecture sections. At one point I asked him to describe examples of risk-taking on his part that turned out poorly and he described of that clicker experience that "...we had to redo a lot of stuff and there were mistakes…[and that the students]…complained about the cost of the clicker…[and wrote]…letters to the dean." Because the clickers failed to meet his expectations in terms of technical viability or student outcomes, he ultimately chose to stop using them entirely.

These statements and others in our conversations provide strong representation of Michael's continual efforts to maintain a practical focus on student learning throughout all of his personal explorations. It is probable that his high degree of pragmatism is also linked to his tolerance for failure. Both aspects of his personality serve to increase his

level of innovation by opening pathways for new projects as he chooses to reject those that fail to deliver student benefits.

Influence of Students

Throughout our conversations (and reconfirmed in the classroom observations) was evidence of Michael's sense of duty to his students. Even after several decades of teaching, he does not simply go through the motions of fulfilling his teaching role. Rather, he seems devoted to continually improving his teaching skills and exploring new ways of engaging his students in a more meaningful learning experience.

This focus on students is reflected to some degree in his continued investment in new technologies, but is more directly represented in his own words on multiple occasions in his interview data. For example, during one interview he told me that the students "…are my responsibility and I have to help them—do something to make sure they do OK." During a later conversation while he was telling me about his continued efforts to improve his teaching I asked him what prompted him to modify just his teaching over the years. He replied that he "…hated what he was doing and the students didn't get much out of it [and] couldn't allow that to go on." He went on to describe how he went about addressing those deficiencies and when I asked him how he felt about it afterwards he said "Good. I'm happy. I'm glad I did it."

Michael's overriding sensitivity to student needs is not limited to his efforts with technology. For example, an interesting example of his student-centric focus came when I asked him in the form of a very open-ended question to describe a particularly good (or bad) experience with his work at the university. He immediately responded with a story about an experience not involving technology that happened to not turn out well for the

student. He described in great clarity his efforts to aid this particular student in his or her struggles.

Further evidence of the central role that student needs play in Michael's teaching activities came when he shared with me his fear of possibly taking their personal situations too seriously telling me that "…maybe I take it too personally. These people are my responsibility and I have to help them, when I really should just be worried about teaching effectively and not worry about their personality." Yet at other times, his attitude was blunter about student needs relative to his use of experimental teaching approaches when he shared that "…I don't think that anybody likes it, but they'll remember it…But I'm going to do it continually. I don't care if [you're] used to it or not…even if you hate every minute of it."

My perception from this recurring aspect of Michael is that even after several decades of teaching he has retained a high degree of passion and sensitivity towards the success of his students. He has also not forgotten his role in affecting their lives. As a factor in the study, his student-centric attitude reflects an intrinsic need to do things that are ultimately for the benefit of his students—including the use of technology. His extra effort with technology could simply be another manifestation of that basic trait of his.

Departmental / Campus Influence

Consistent with the other participants in this study, there is little evidence that the culture in Michael's department generates any material impact on his attitudes or efforts relative to experiments with technology. More significantly, of the four cases examined in this overall study, my perception is that Michael's department perhaps reflects the least supportive culture relative to using technology in teaching and is the least involved in

providing guidance or influence towards the individual approaches of different faculty members.

Part of the interview process with each participant was designed to probe the department's attitude about the relative value of teaching and research. When I asked him to reflect on what motivational factors influence his departmental peers relative to his efforts at innovating with technology he noted that unlike him, "…most people just want to make sure they can write enough papers." This research-centric attitude of Michael's department was echoed in a later interview with his department chair when he shared his opinion that "…in reality…the truth is as long as you're doing a moderately good job of teaching and you're publishing good papers…you get tenure here." It seems evident from data gathered from both Michael and the chair that the atmosphere of his academic unit is not very strong regarding investments in teaching relative to research.

But while the departmental culture was represented as valuing research effort more highly than teaching effort, there was also evidence of a strong sense of value towards student success alongside high research expectations. The competing and unclear nature of teaching versus research in this department was most clearly represented by the department chair when he described his view of teaching this way:

> My own view is that it's the single most important thing we do. As a chairman though, I know I'm constrained by the local research mission, [although] I just don't see much of a trade-off. So I don't see anybody being punished for being…for emphasizing teaching a lot at the expense of research—at all…To get tenure here is really the bottom line. You really have to achieve minimum standards in research. You also have to achieve minimal standards in teaching.

> Luckily, I don't see those things as mutually inconsistent because, in my experience, people who have done best at research have also turned out to be good teachers.

But while his department chair expressed affirmation regarding the teaching mission of the department of economics, he also did not provide evidence of directly attempting to persuade faculty in the unit to alter their approaches (or outcomes) towards that goal: "Do we sit down and talk about this—about the relative importance of teaching? Hardly ever." Further evidence of the department chair's hands-off approach towards faculty innovation was evident when he told me that:

> I guess I'm uncomfortable with the word innovation. I think there are good teachers and there are bad teachers. And you can give all the technology you want to the bad teachers and it's not going to make them better.

Perhaps the most direct comments he shared regarding the complex interaction of his personal attitude and leadership approach regarding technology came when he admitted personal reservations regarding technology in that:

> I'm a bit of a heretic on this. I don't want to call myself a Luddite, but I'm a bit of a heretic. [And] as a matter of principle, I try to avoid telling them what to do in the classroom.

And while Michael's department chair considers himself to be somewhat distant from the use of technology in teaching he is also not oblivious to its application within the department. For example, when I asked him to indentify a faculty member in his department who stands out as being particularly innovative using technology in the

classroom, he quickly named two that stood out in his mind with Michael being one of them.

In summary, while Michael's department does not appear to be openly antagonistic towards instructional technologies, neither does it present an overtly supportive position. It is also clear that, while student success is a valued goal of the department, research activity carries more value within the departmental culture. As a result, faculty members in that department who choose to pursue innovations with technology do so with little or no overt inducement within the department. In spite of the lack of any support within the department, Michael has maintained a positive and active attitude towards his interests regarding instructional technology innovation.

The Role of Campus Administration

Regarding the influence of the campus administration and overall institutional culture Michael's perceptions are that the campus administration places little value on teaching effort. Bluntly assessing the administration's view towards rewarding good teaching, Michael stated that "…my opinion is that I don't think it counts all that much…" in their eyes. And relative to his efforts to use instructional technology, his perception of the role of campus administration is that "…not much. What I do is related to what I'm interested in—period. I don't worry too much about other influences." This somewhat cynical perception of the attitude and influence of the campus administration was echoed by his department chair who commented that:

> My attitude towards administration is always kind of…I read once the way Russians look at government is like the weather. You go inside when it's wet, go outside when the sun's out and you deal with whatever the government is

doing…Outside forces that you just have to deal with. That's the way I've thought about—frankly…An unnecessary evil sometimes.

It would be difficult to extrapolate from these two descriptions of institutional attitude that Michael would derive much supportive influence from the campus culture towards his uses of technology. And while Michael and his department chair both acknowledge the availability of campus-wide resources (technology, training, etc.), they give only marginal credit to its influence on activities within the department. Thus, it appears that for Michael the campus administration holds very little sway on his activities related to technology innovation.

Networking

Of the four case participants in this study, Michael exhibited what appeared to be the least evidence of dependency on networking and collaboration as a means of identifying new technology innovations to pursue. While he did describe various experiences of attending seminars and other open events at the campus level where technology and teaching were discussed, it was not clear that these events provided any formative input into any specific projects he has undertaken over the years. For example, on several occasions during the data collection process, I directly probed the value of networking. In response, he provided only a cursory recognition of the small influences such activities had on his level of activity with technology.

Instead, Michael appears more likely to rely primarily on a combination of his own research and personal instincts than on external influences. His efforts with technology seem to be primarily a derivative of his natural curiosity to continually

explore. As he told me at one point: “What I do is related to what I’m interested in—period. I don’t worry too much about other influences.”

Career Balance

It would be reasonable to assume that the issue of career balance with Michael is influenced by his late career stage. That is, given that he achieved tenure and full professor many years in the past, it would be reasonable to assume that professional pressures are lower for Michael than for the other three participants in the study who are at much earlier stages in their professional careers. A clear indication of the professional latitude that a senior faculty member such as Michael Gootzeit should be able to enjoy came from his department chair who told me that “…[he is] not sure that anything impacts full professors” such as Michael. In spite of the reduced pressures, Michael still provided evidence in a number of instances of his continued interest in scholarly work. He also described working to connect his teaching activities with his research interests thus allowing them to be mutually beneficial to his career.

It is also important to reiterate at this point that Michael’s career with the university started well before it had moved from a teaching only orientation to a research-intensive direction. It is reasonable to assume that Michael’s tenure and promotion measurements are more reflective of the teaching outcomes orientation of the campus in his early days when compare to more recently tenured faculty. Data was not gathered in this study to confirm (or refute) that theory.

Age/Gender/Money

Throughout the discussions with Michael, there was little direct evidence to help explain the potential influence of money, gender, or age on his efforts with technology.

Exploring gender was hampered by the fact that his department is male-dominated and gender-centric issues did not come up in our dialog. The role of money also did not naturally surface in any of our interviews or observations thus making it difficult to draw useful conclusions. Regarding the matter of age however, it is somewhat self-evident that Michael's inclusion in this study group suggests that, at least in his case, advanced age is not universally related to a diminished capacity to experiment with technology.

On the other hand, the lack of strong evidence among these three factors (money, gender age) suggests that their influence on Michael's attitude towards technology is either minimal or non-existent.

Classroom Observations

Michael's Economics teaching load consists primarily of multiple large sections of lower-division classes. He also tends to conduct all of his classes in the same room which includes theater-style seating for about 100 students and is equipped with a campus-standard audio-visual teaching configuration. As a result, the three observations were very similar to each other. This consistency gave me more opportunity to look for subtleties and patterns across all three.

Watching Michael teach a class is a lot like having a conversation with him about his teaching activities. The dialog is peppered with a variety of technology terms and representations of his natural curiosity about a wide range of topics, from economics to cell phones and movies. Sitting in a classroom with 75 students while he is teaching is very much like a private interview in his office—it is just that the size of the audience is a bit larger.

For example, his use of the word “interesting” (and its derivative forms) occurred at about the same frequency as in our interview sessions. Also as in our interview sessions his classroom dialog included a wide variety of technology terms including those listed in Figure 4 (Technology-Rich Terms Noted in Classroom Observation Sessions).

eCourseware	VPN
MP3 lecture recordings	Router
Cell phones	Wireless networks
Browsers	CISCO
Online practice quiz	Remote Desktop
Online journals	VPN
	Firewall

Figure 4. Technology-Rich Terms Noted in Classroom Observation Sessions

What became evident to me in observing Michael is that there are not two personalities—what you see about him in private conversation carries over into his teaching activities. His natural curiosity about many things, including technology, is as evident in the classroom as it is in his office.

One pattern I noticed across the three sessions was how he has been able to modify the mechanics of how he teaches a large class to include a great deal of technology dependency but not modify his basic lecture-style mode. In subtle ways, he has created an efficiently-delivered 21st century version of a traditional lecture-style class.

His entire class structure is centered on the use of the campus learning management system for both in-class lectures and outside homework by the students. All of his class lectures are in a digital format and accessible to anyone logged into the online area of his courses, including the students. During class time he uses the online course

area to access and present the lecture material. In this clever way, he has maximized the students' opportunity to review class materials and also eliminated the need for him to carry around notes, CDs, memory-sticks, or laptops computers. Everything he needs to conduct a class is available in the online course area. Basically, he just walks into the classroom, logs into the teacher's machine and begins the session.

He is so adept at using this digital-portfolio approach that I observed him use the whiteboard only one time out of all three sessions. As I was sitting in his classes, I could not help but notice the contrasting style between Michael and other users of this same room who left a chaotic mess of partially-erased ghost writing on the white board at the front of the room. These others depend heavily on the whiteboard; Michael barely touches it. This small observation was significant to me in reaffirming the unique status of Michael as a technology innovator within his department and the autonomous way in which he pursues that path.

Recap of Michael Gootzeit's Story

In looking back on my time with Michael Gootzeit, the most striking thing about his teaching motivation is his keen curiosity regarding technology as an educational tool. No matter what direction we took in the conversation or how I framed the interview script, the dialog almost always came back to his personal interest in exploring technology and trying it with his students in the classroom.

While other external factors (networking opportunities, departmental culture, money, etc.) were examined in a variety of ways with each reflecting varying degrees of influence, their impact seemed largely inconsequential as a substantive source of motivation. Michael provides perhaps one of the best examples in this study of the

strength of a purely intrinsically driven motivation. His story also reflects how the culture of a complex and diverse structure on a research-intensive campus allows for a great deal of professional autonomy among tenured faculty.

The Story of Susan Popham (Case Study 4)

> I love teaching. I really do. Yeah, I like to see my students do good work. And…I honestly believe that what [they] learn in my class helps to improve their lives…and really does motivate me. So, even when I do put into technologies that I think I'm not sure that this will help my students much, but maybe it will? When they come back and say 'You know that Dreamweaver thing? That was really important. I applied for this job and one of the things they asked was "do you know how to do Dreamweaver?"…but I learned it in your class.' Those kinds of things.

Susan Popham is a tenured faculty member in the department of English and teaches a mixture of undergraduate and graduate courses. She also maintains a steady and productive research effort in the area of medical terminology and communication. Susan is a very open and engaging individual who is very quick to share an idea or probe you around some question that is on her mind. She exudes a very positive and upbeat personality.

As I spent time getting to know Susan better through this study I came to believe that she is fearless in her approaches towards new technologies (although some of her statements in the interviews indicate she perceives the opposite of herself.) I was not sure if there is anything that she will not try. For example, she was using blogs, wikis, and

developing fully online courses well before many in her department or across campus were even considering them.

In our interviews, she generally talked about trying new things as casually as one might talk about taking up a new hobby such as gardening. She talked of such experimental efforts in a positive, self-confident tone that left me with the impression of them being joyous experiences for her and not stressful or fearful. Through my time with Susan in this study, I came to believe that she approaches teaching in the same way she approaches her entire life where everything is a Christmas gift to be unwrapped and enjoyed.

Not only is she excited about trying new technologies, but she also cares deeply about her students and their academic success. Throughout our conversations, evidence of Susan's desire to be an effective teacher with her students came through over and over again. Both passion and compassion are attributes of Susan's approach towards teaching.

Intellectual Curiosity

At the most basic level, Susan finds technology as a source of intellectual exercise. She describes in multiple ways her intellectual curiosity about many things beyond English composition including cooking and quilting. But she has found technology to be a steady source of both new challenges and new avenues to explore. My impression is that Susan gets bored rather easily and technology offers a mean for her to shake that boredom on a regular basis.

For example, early in our conversations I asked her about her exploratory nature and she told me "I'd say I've recognized for a long time that I like to learn new things. So

there are times in my life where I find myself bored and I think 'oh, you want to go…you want to learn something new!'"

And later in that same conversation she described her intellectual curiosity this way: "Well I think…there's a common thread both in the ways which I approach technology for class as well as the ways in which I approach these kinds of hobby kinds of explorations. And the common thing is that I like to learn new things. I like to challenge myself a little bit."

Not only have these interests in technology carried over to her faculty role, but they seem to infuse her entire life, both personal and professional. It seemed like all of my conversations with Susan about her teaching activities were peppered with terms you would typically hear in a conversation with information technology professionals. Terms like HTML, wiki, blog, or Web 2.0 are as natural for Susan to use in casual conversation as terms and concepts about grammar, syntax and style. To put this in context, out of the three interviews I had with Susan over the course of this study, I counted dozens of uses of words typically associated with technology-centric conversation in her dialog.

This interest in technology appeared to start while she was in graduate school where she was a teaching assistant. She described how in her graduate teaching role, she had shared responsibilities with a group of other teaching assistants for maintaining the computer labs on her campus including a great deal of latitude and autonomy in how she managed things. Through those formative experiences, she discovered the many ways in which technology could be used in teaching which has carried over into her faculty role.

Her Sense of Commitment to Teaching

On top of her strong fascination with technology is the very high value she places on her teaching role. Over the course of our interviews, she shared several lengthy stories of specific student situations in the past at such a level of detail you might have thought they occurred last week and not several years in the past. One good example of how she views her teaching role was the story she told of a student who had great difficulty in one of her classes as well as her internal struggles related to his learning failures:

> And I thought I was doing a really good job with the students, with this class. And I had good students in the class and I was working well with those students. I always have some students who don't do as well. But a couple of students in that class struck me as people that I didn't do a very good job with. One student in particular. He kept trying, [but] just really never got beyond talking about what seemed funny or fun to him at that time. And I suspect that there were some learning disabilities and learning difficulties with him that…were not diagnosed. Because it was clear to me he hadn't done all the homework. That he hadn't been paying attention in class. But I was also really frustrated because I thought "here's a student who, despite all of my really good hard work and despite all of…what I suspect was hard work for him—just still can't get it."

Although unrelated to Susan's efforts with technology, the story of this student and her internal struggles regarding his plight highlight the great value Susan places on her role as a teacher to all of her students—regardless of their individual circumstances. As will be seen below, she carries this strong sense of dedication to student learning over to ways in which she applies technology in her classes.

This central role of teaching in her work was perhaps best expressed when I asked her about what she likes most about her work at the school and her reply was quick and direct: “I love teaching. I really do [and] I want my class to help improve their lives.” She also shared with me her personal belief that effective teaching in the 21st century by definition entails use of contemporary technologies noting even that “If I had to do it over again, I’d have learned [to use technology] even faster…”

It seems that in technology Susan has found something that addresses two strong inner drives: (1) as a means to become a better teacher and (2) as a source of constant intellectual challenge to feed her natural curiosity about new things.

New Ideas and Networking

When it comes to selecting new technologies to try with her students, Susan is both purposeful and serendipitous. The purposeful facet of her research is expressed through an internally driven behavior in which she pushes herself as she puts it to consciously “…take on at least one new technology every year…” Although the dialog did not explicitly tell me, it is reasonable to assume that Susan’s conscious efforts to take on a new technology each year is likely related to her basic curiosity about new technologies.

The process she uses to research new things to try comes in a variety of ways, but the majority of her new ideas seem to be derived from networking activities. Again, knowing that these networking events are a good way to be exposed to new ideas, she takes a purposeful approach to putting herself into networking situations noting that “…I have to make myself do it because I think my normal inclination is to stay in my office…So I kind of have to push myself.”

Another example of how she consciously puts herself in positions that expose her to new technology ideas came when she noted that "…when I go to conferences, I make myself go to presentations that incorporate technology…" It seems clear from this evidence that a central theme to Susan's approach with technology innovation is a self-imposed pattern of placing herself in situations where teaching and technology topics are discussed.

On campus, she also is a regular attendee at many of the instructional technology sessions in the local faculty support center as well her participation in peer-led special interest groups both inside and outside of her discipline. For example, she described experimenting with blogs and wikis directly as a result of participating in on-campus networking events. Within her department she also discussed the value of being asked to lead technology skills workshops for her English colleagues noting that: "I'm excited about it because to do those workshops means we have to talk about our teaching and we don't very often talk about our teaching." Similar to the other case participants in this study, it appears that networking is vital to her discovery of new things to try.

An intriguing facet to Susan's advanced aptitude with classroom technology is the relative insecurity she expressed relative to her colleagues telling me "…I'm always jealous of other people. They get things done faster, better, whatever…but I recognize that for me the technologies are time-consuming. They just are—that's the way it is. But, I try to allot time for that…" This insecurity seems in contrast to the relative ease with which she actually adopts new ideas and the high level of success she appears to achieve in using these tools and techniques with her students. Thus it appears that Susan has

sufficient inner drive to overcome these insecurities and continue to aggressively pursue new technology-centric initiatives.

In contrast to the purposeful ways in which Susan exposes herself to new technologies via conferences and local networking events, the serendipitous side to her development of new ideas is reflected in the apparent lack of a specifically defined time, place or process that she uses to select specific new technologies to try. Beyond the networking and self-development exercises, the moment of selection of a specific new technology tends to just pop out of a hallway conversation or an observation gathered from a conference or networking session. The best example of this aspect of Susan's approach came in her response to a question I posed regarding her choice of specific technologies to try:

> I don't know what leads me to try one new thing over some other thing. This year it was blogs; I decided to try blogs and to incorporate those into my classes. And I don't know…I just saw those as being a good way of doing a class discussion—of using that as a class discussion tool. And someone said "Try a wiki!" Some of what prompts me into one new technology over another is "I'll just keep my ears open" or someone will say Oh, try this. Or something like that.

This unstructured approach was reinforced later, when I asked her to describe the due diligence process she applies when evaluating new technology tools and she answered simply that "…I just try it for this semester and see how it works. If it works well, I'll continue it. If it doesn't, I'll try to find some other way to incorporate this. But a lot of it is just "let's just experiment for one semester and see how it goes."

Although Susan applies a somewhat wide-open model of discovering new innovations to explore, one thing that is not accidental is the expectation that all technologies must be clearly helpful towards the students' learning needs. They are not to be treated simply as exercises in personal curiosity. Rather, each choice is carefully considered for specific learning needs in one or more of her classes describing her thought process this way:

> …with [a] technology, I will ask myself "Will this be beneficial to the course? Will this help the students in my course?" Not just will it help them in their life. Does it help them to know how to…insert a picture or maybe a picture of their bookmark or whatever their desktop, background wallpaper—whatever? But, will this really help them in this course? And if I can think of a way in which this…is a pedagogically beneficial technology then I'll put it in.

A specific example of this critical evaluation approach came out in our first interview, when she described the exercise of deciding to move from a blog to a wiki for group projects in one of her classes:

> And some students never did get it. They just didn't at all. And, I also felt not just that it was technologically problematic, but also that it…it went against what I wanted. I wanted a space where everyone's voices, where everyone's ideas were equally valued. And…when I realized that it was my blog and students were going to be adding comments to my blog, I thought "This is not what I want to represent." I want something that represents equal value to everyone's comments. And, a much more democratic space …to come in and put comments on...So this

> semester I decided to add a wiki in order to get that kind of democratic space where people could add their views and post their views.
>
> I got rid of…the blog [and replaced it] with the wiki…and at the beginning of the course this wiki seemed to be that kind of democratic space of people's ideas and people responding to each other's ideas, but now it just has become one more hoop that students have to jump through in order to finish the requirements for the class.

Student Feedback

One factor that clearly impacts Susan's efforts with technology is the feedback her students provide in reaction to the various innovations she introduces into her teaching. This is likely related to the practical value metric previously described for her. It was also expressed when she discussed the influence of outlier students—particularly those who are struggling to succeed—and how she adjusts her teaching style to reach them. Her approaches towards addressing the needs of outlier students with unique difficulties were both specific:

> …here's a student who, despite all of my really good hard work and despite all of his—what I suspect was hard work for him—just still can't get it. So, I went back and I revised that particular assignment and that particular handout. I just made it easier for everyone all the way around.

…and general:

> And I do wonder sometimes to what extent…I have failed them by still not giving them what they need. [So I try to react] immediately. When I recognize that I have some outlier students, usually it's by the first assignment which comes

within the first 3 or 4 weeks of class. Or if I can tell from what's going on in class exercises or class discussions…I'll try to focus on that student a little bit more.

When I asked her about the effectiveness of changes that she adopted as a result of situations involving such outlier students, she provided an example of a more positive nature:

> It was very effective. I have…changed the class quite a bit, so that I no longer have that particular assignment…When I tweaked it, it was very beneficial. Students…are always open to the idea of evaluating their sources. And so we've continued to talk about…evaluating the web sources.

Considered another way, student feedback affects Susan's attitude towards innovation in the same way that she becomes emotionally involved in the success of all her students. If they struggle, she perceives that she has somehow let them down. If the technology does not help them learn, she drops it.

What can be drawn from this is that ultimately, the students' learning needs come before her intellectual curiosity needs. The feedback of the students functions as both an extrinsic factor in that the students are an outside force and intrinsic in that it is functioning to fulfill a personal desire to ensure that her use of technology has increased their chances for success.

Her attitude about students coming first was perhaps best captured when she told me that:

> …my number one goal is 'How can this benefit students? How can this help them learn?' If I don't see a real way in which that's going to help them learn, no matter how cool the technology is—I probably won't incorporate it.

Money as a Motivator

At several points in my observations of Susan, the role of money as an influential factor came up both in the interviews with her personally and later during the interview with her department chair. The first discussion of money came up when she was telling me about how her summer teaching assignments generated a conflict between family issues and the need for "grocery money" as she put it. When I asked her what motivated her to switch from traditional classroom-based teaching to fully online sections, her rationale centered directly on personal and financial needs:

> Question: What compelled you to change from lecturing to what you're doing now?
>
> Reply: Two things: for one there is my family. [We] get extra income for teaching in the summer. It's not part of our normal workload. So I teach in the summer in order to have grocery money…So I suggested to someone when they asked me what summer courses I wanted to teach, I asked if I could do an online course- in order to allow me to stay home with my children and teach and still maintain that summer income.

It is important to recognize that Susan had been teaching fully online courses for a long time and was very comfortable with its unique techniques and protocol. Thus, at her level of technology innovation, teaching online is just a standard means of teaching, not something she treats as noteworthy or particularly challenging. But the fact that her rationale in this situation was very much income-centric and allowed her some income potential beyond her less-technological colleagues is a reminder that technology innovation is not completely disconnected from personal material considerations.

Beyond this single example, the larger conversation about money with both Susan and her department chair centered on the shared benefit for the entire English department of fees that a soon-to-be-launched fully online writing program will produce for the department. Although there were clearly positive comments related to income from both Susan ("I'm all on the bandwagon, especially if it's going to make money…for the department.") and her department chair ("…there are some individual financial rewards for developing online programs at this university…"), they were both describing an altruistic model of income sharing to benefit the entire department and not for the personal gain of specific individuals.

Thus, the role of money as an external factor influencing Susan's behavior was generally consistent with a theme coming from this study that it is most relevant for the provision of resources for the larger academic community. This was illustrated by her contributions to the department's new online programs. Among the four participants, however, Susan was the only one to provide direct evidence of personal income derived from technology innovation as influencing her behavior. This was evident when she talked about volunteering for online teaching opportunities in the summer as a way to augment her household income.

Departmental Culture

Obtaining a clear picture of the role of departmental culture as a potential influencer of Susan's behavior was not easily derived from the data. As noted at the beginning of Susan's story, she works in a very large department of over 50 full-time faculty members with an equivalent number of part-time instructors and graduate teaching assistants. In such a large group of over one hundred individuals there will most

certainly be a very wide variety of attitudes, capabilities, and activities with respect to their use of instructional technologies. The department chair affirmed this when he noted that:

> …it's hard to generalize because we have so many different programs, so many different research interests and teaching interests across programs that if you pick any five faculty members out and try to generalize from them—you could get radically different opinions.

It is thus reasonable to assume that such a large group could include at least three or four other faculty whose level of technology innovation met the fundamental criteria of this study and might have been included instead of Susan. She just happened to be the one I selected.

Further complicating the issue of ascertaining departmental culture and its influence was the fact that Susan's department chair was very new in his position, having come to the campus less than a year prior to the time of the interview. His tenure on campus was insufficient in his own words to have been able to accurately perceive or significantly influence the overall environment of the English department.

In spite of the unclear view that had emerged regarding the role of departmental culture on Susan's behavior, some evidence was provided that appears to relegate departmental culture to a relatively minor supporting role on her individual attitudes and motivations with respect to technology innovation. An example of the minimal impact of department influence on Susan's individual behavior came when she noted that "I don't know. To a certain extent there is some support for [my teaching online], but I'm not sure that there's a whole departmental culture." Although she did not describe a culture that is

strongly opposed to technology innovation, she did imply that there is an undercurrent of fear and mistrust of its use in pockets of the department. From Susan's data it seems the role of departmental culture appears to be neither openly supportive nor opposed toward technology innovation.

Data gathered from her chair added more strength to the notion of an ambiguous role played by departmental culture. On the one hand, he shared that "…my personal attitude is that teaching is extraordinarily important…" in the English department. He told me that he has made this attitude "…particularly clear in our departmental meetings." theorizing that regarding technology in the classroom "…we don't have a resistant culture [in English]."

Then he further muddied the waters by suggesting that "...I don't necessarily believe that there is a direct relationship between technology and teaching effectiveness." More confusion regarding his potential influence on faculty attitudes and behavior came when he noted that "…I can't think of a specific anecdote where my leadership directly led to a teaching innovation." On the other hand, Susan described one particular event in which her chair provided leadership in encouraging more mentoring between professional faculty members and graduate teaching assistants in the department.

What seems evident from this data is that the departmental culture in English regarding technology innovation is both supportive and non-supportive at the same time thus leaving individual faculty to make their own choices without obvious external reward or punishment. As with the other three cases in this study, the departmental culture in English appears to exert minimal influence on Susan's fundamental attitudes

towards technology. It neither dramatically expands nor restricts the extent to which Susan opts to innovate with new technologies in her teaching. Its effect is neutral.

Campus Administration

It is important to also reflect on the role of the campus culture and/or institutional leadership as an influence on Susan's efforts with technology. As with the other participants in this study, Susan provided little evidence to suggest a direct role by the campus administration on her behaviors or attitudes. In fact, there was little evidence that Susan had even formed a perception of the campus' attitude regarding instructional technologies. She did however describe on several occasions her participation in campus-supported fellowship and grant programs. She also described in several places throughout our discussions the clear benefit she derives from the availability of the support professionals in my center as campus-funded resources:

> So when I go to these kinds of workshops and forums, and things I think "Oh, OK, that's what that is!" So I can understand the world that they're in, they're getting into.
>
> Well, I would not have done as much as I've done without the ALC. And the technology grants and the TFP, and those kinds of programs were highly influential. Had those things not been there, I don't know that I would have perceived it as much. And just knowing that if I take on a new technology [and] if I have trouble with this…that there is someone on this campus who can help me resolve this. I know that there are people who can help me with this. That…makes me much more likely to say "OK, I'm going to try doing this."

Thus, based on the data gathered from Susan, that while the campus administration exerts an influence on her attitudes, it does not appear to be direct, but is instead limited to indirect influence through campus-wide programs and services provided to those faculty members who choose to adopt new technologies into their teaching.

Conversely, the comments from her department chair regarding campus administration were a bit more reflective of a direct influence noting that "...my opinion in [the] just ten months I've been here is that the university values teaching very highly…[and that]…I'm impressed…with this university's interest in making technology available to the professoriate and encouraging the integration of technology into the curriculum." From this data it seems evident that Susan and her department chair see the role of campus administration towards technology innovation in very different ways. He sees the campus as recognizing the value using technology in teaching while conversely, Susan's perception is that the campus does not recognize additional use of technology as a valuable professional investment.

Persistence

It is important to comment on Susan's relative high degree of persistence with pursuing new and challenging technologies. Largely reflective of a pre-existing positive motivation, Susan exhibited a tendency toward persistence that was similar to the other participants in this study. As an early and aggressive adopter, Susan has had to deal with a variety of challenges and circumstances that do not always have obvious or easy solutions. In spite of these difficulties, she continues to pursue challenges involving new technologies. There were times during data collection when I felt as though she was

virtually unflappable when it came to overcoming technological challenges. She told me of always keeping a "Plan B" approach at hand for technical roadblocks. A very good example of her positive attitude and resilience to challenging circumstances was when she described how she developed (apparently without outside assistance) a work-around solution to a technical challenge involving students in a new fully online course:

> Generally, I think if I'm calm and I say "OK we'll try this" they tend to be calm too,…but the fact that I was teaching online I had two students who were having a good deal of trouble getting registered for the course…and they were having a good deal of trouble trying to get all the forms…And because they couldn't get registered, they weren't put into the online class…So I was emailing them the assignments…and just saying "OK, until you can get into the class, into the course management system. And I think they were relieved—at least in the emails they sent to me. "OK—thank you very much. We can do this." And I said that I'm willing to do this for a couple of more weeks until we can get all the forms and the paperwork worked out. And so that wasn't really the technology's fault as much as it was just a sense of "I'm going to have to do something different with these students", and it worked.

Throughout our discussions and during her descriptions of such events, Susan never expressed resentment or anger; she generally just smiled and talked about them as if she was describing a tennis match with a friend. What seemed clear during the descriptions of Susan's approaches towards technology was that an inner strength and confidence helps pull her through the inevitable difficult moments that are always waiting in the wings for experimenters with technology.

Classroom Observation Results

With Susan, I had the opportunity to collect classroom observations in one traditional face-to-face class that she taught in the spring semester and from two fully online courses she taught in the fall semester of 2009. I was limited to observing only online courses in the fall because all of her classes that semester were offered fully online. The most valuable aspect of my classroom observations with Susan was to confirm what I heard in the private interviews with her. In that respect they served in a triangulation function.

For example, in our interviews, she talked about being comfortable teaching entirely online and I was able to observe specific examples of her teaching several fully online classes. She also described in our interviews being willing to take on challenges with technology. One of her two online classes that she allowed me to observe was brand new as a fully online course and first of a kind in her department with Susan being willing to take on that responsibility.

Within her online courses, I found consistent evidence of her using an extensive variety of technology tools. This is reflective of someone with a healthy level of both aptitude and confidence around technology. The syllabus of her online class was peppered with references to class activities built around these various tools. A specific example of a technology she discussed in one of our interviews as the use of a wiki for writing assignments. Presented in figure 5 (Syllabus Artifact on Wiki Assignments) are the instructions from her syllabus for using the wiki.

WIKI: For each week (15 weeks total) you will write responses to the readings in course WIKI (you will find a link under the appropriate Unit). These responses should respond to your classmates responses and questions and should help other classmates form their own responses by asking questions of them. These responses may help you develop ideas for your assignments: you are certainly free to draw from (don't plagiarize; cite your classmates) these responses as you write your papers. You must post approximately 500 words for each week. While this writing is much less formal than that required in the unit writing assignments, you should still strive to make your responses to the readings in clear, coherent, and correct prose. When I grade these, I will mostly be looking for evidence that you have read the readings thoughtfully and have tried to post intelligent comments about the readings.

Figure 5. Syllabus Artifact on Wiki Assignments

Additional evidence of Susan's approach for creating a rich learning environment for her students was reflected in my use of the modified School Observation Measure (SOM) (Ross, Smith, Alberg, & Lowther, 2004) instrument on her teaching style in which I observed that she uses 21 of the 24 possible classroom techniques included on the instrument either frequently or extensively.

The traditional class that I observed was at the other end of the technology spectrum and included very little use of technology (other than reference to an assignment using the campus wiki). Observing her teach in a traditional setting was not without benefit to this study. For example, the very purpose of the class content (teaching undergraduates how to write) was indicative of her passion about student learning and the teaching process that came out in our interviews. At multiple points during the class she talked about such things as "finding the student" and deconstructing the science of how to teach writing to undergraduate students.

I came away from the classroom observations of Susan with a strong reaffirmation of what came from the analysis of her interview data. It served to strengthen my confidence in the other results presented about this participant. The

attitudes and behavior patterns that come up in private conversation about her activity with technology follow her into the classroom.

Summary Notes on Susan Popham

In looking back over my observations of Susan, what stands out most is the fact that she simply enjoys teaching a great deal and finds great reward in how students respond to her efforts with technology innovation. She is intrinsically rewarded by both the reactions of her students (feedback) and the way in which constant exploration of new technologies satisfies her natural curiosity about new things that are intellectually challenging. She sticks to a requirement that student needs come first, but is almost never satisfied with what worked in the past when it comes to technology. In her mind there is always something potentially better out there.

She finds that "something better" through a combination of regular networking and purposefully-designed effort in self-development. And although she recognizes and takes advantage of resources and support provided at the campus-level and in her department, it is fairly clear that if these two areas of support were not available, she would still find ways to fold new technologies into her teaching activities.

Tier 2 Analysis and Representation: Cross-Case Analysis

Although the study participants came from widely disparate academic areas, career levels, and age groups, there were a number of common themes that emerged from their four stories. There were so many interesting things that I observed among these case participants that I was concerned about presenting an overly dense list of findings. This reminded me of the continual challenge in qualitative research to separate the substantive from the minor. To address this concern, I chose to only report themes that either were

strongly evident in two or more of the case studies or were extremely strong (numerous coded instances) within a single case story. While many of these reported themes have their roots in results drawn from previous studies, several of them emerged directly from the data collected in this study.

A total of 14 factors (or themes) were identified, with varying degrees of strength, which I organized into two broad categories. In the first category are factors that represent observed phenomena that are indicative of positive influence on the motivational behavior of the case participants. I refer to these as 'positive effect' influences. That is, the influence represented by these themes appears to increase the likelihood or frequency of activity related to innovative use of instructional technologies in their teaching. In the second category are themes that represent influences that were not shown in this study to provide an observable impact on the motivation or behavior of any of the four case participants. I refer to these as neutral effect influences. This latter group was representative of potential influences suggested by the literature; however, analysis of the data collected in this study did not provide any significant evidence of their providing an impact—either positive or negative—on the level of technology innovation among these four case study participants.

Another interesting aspect is that no negative factors (demotivational influences) emerged in this study. In other words, nowhere in this study of a small pool of highly motivated faculty members did themes emerge to suggest there are factors (internal or external) that result in reducing their level of effort or motivation related to innovation with technology. There could be many explanations of the absence of negative factors in this study. These explanations might range simply from aspects of the study design, to the

more interesting possibility that that these four case participants have only an "on" button when it comes to their attitude about teaching and technology: very few forces seem to slow their actions.

Tables 7 and 8 provide a summary and brief explanation of all fourteen reported factors grouped into the two broad categories: (1) factors that showed a positive impact on their use of technology and (2) factors that showed no impact on their use of technology. Please refer to Appendix I for a detailed discussion of the themes that were reported and their associated codes, including representative examples of coded data drawn directly from the interview transcripts.

Discussion of Reported Factors

In this section, each of the fourteen individual factors listed in Tables 7 and 8 are discussed in detail. I also note their appearance among the four case studies.

Factors Providing a Positive Impact

The following 8 factors represent influences that appear to increase the level of innovation with technology by one or more of the case participants. Rather than attempting to treat these universally as motivational influences or classify them further, for the purposes of this analysis, they are being reported simply as factors that influence behavior among these faculty and increase the extent to which they invest time and effort innovating with technology.

Factor 1: Intellectual Curiosity

One of the most obvious and consistent themes that emerged from this study is the powerful effect that personal interest and intellectual curiosity have on the case participants' behavior with technology. Simply put, they find technology interesting, and

experimenting with it in their teaching activities fulfills that interest. Their intellectual curiosity about technology compels them to continue to explore and experiment with it. All four participants in the study group provided clear evidence of the relevance of this theme.

Very frequent use of the coded phrases indicating this theme occurred during the case interviews of all four when discussing their efforts with technology. With one case participant, I counted more than 50 occurrences of the word "interest" and its variations. Examples of intellectual curiosity were evident in most interviews of all four participants as well as in some of the classroom observations where it appeared in dialog and interactions with the students.

Perhaps it is not surprising to suggest that intellectual curiosity affects faculty behavior given the strong cultural and professional roles that inquiry and intellectual exploration play in their professional success—particularly on a research-oriented campus. Their choice to pursue this intellectual curiosity in their teaching may result from the classroom being a good laboratory in which to conduct experiments.

Table 7

Summary of Reported Factors That Showed Impact

Positive Effect Factors: Shown to increase technology activity		
1	Intellectual Curiosity	The case participant pursues technology innovation based on personal intellectual curiosity.
2	Competition / Differentiation	Innovation with technology fulfills a personal need to differentiate or compete professionally.
3	Student Feedback Loop	Reaction by the students to the introduction of technology provides a positive reinforcement.
4	Networking with Colleagues	Opportunities to be exposed to new ideas through colleague interaction increases levels of innovation.
5	Campus Administration (Resources)	Resources (technology, training, support) provided by the campus support innovative behavior.
6	Money (Indirect)	Departmental tuition and fee income derived from new online programs functions as a positive motivator.
7	Previous Exposure	Previous exposure to technology in graduate school or early career reduces barriers to innovation.
8	Persistent Personality	A persistent attitude of pushing through challenges by the case participant supports their ability to continually innovate.

Table 8

Summary of Reported Factors That Showed No Impact

Neutral Effect Factors: Showed no impact on levels of technology activity		
9	Departmental Culture	There are conflicting perceptions between the participant and their department chair of how the campus rewards technology innovation. However, the campus culture does not appear to provide a direct impact on the behavior or attitude of the case participant.
10	Campus Culture	The campus culture regarding efforts with technology in teaching does not appear to directly affect behavior or attitude of the case participant.
11	Money (Compensation)	Money in the form of direct compensation to the case participant provides limited impact on attitude or behavior regarding efforts with technology.
12	Career Stage	The career stage of the case participant (pre-tenure, post-tenure, late-career) does not appear to impact their level of technology innovation.
13	Research Expectations	Research productivity expectations do not appear to reduce levels of technology investment.
14	Age	Attitudes towards experimentation with technology do not appear to be strongly age-related.

Factor 2: Competition/Differentiation

Two of the case studies presented strong evidence of the role that competition and differentiation play in affecting their efforts with technology. The opportunity that technology innovation offers to professionally differentiate themselves (or outcompete at some level) from other (presumably) less innovative faculty members was evident throughout the data. Among the two who presented this factor, there were frequent direct references describing their competitive drive and need to differentiate. It is reasonable to suggest that, like intellectual curiosity, their internal competitive drive is an inherent aspect to their personalities and the pursuit of high levels of technology innovation is a means to fulfill that need. It is probable that competition is the central component to this factor and differentiation is one manifestation of it.

An interesting side note to this factor was its being limited to only the two male participants in this study, with no evidence of it among the two female participants. I was tempted to report this gender split as an identified theme under the gender factor, but held back because of reservations related to the study design and its non-quantitative nature. Ultimately, my conclusion as a researcher was that the evidence was not strong enough to treat as its own theme. On the other hand, exploring this possible gender-related aspect of faculty behavior could make for a very interesting future study.

Factor 3: Student Feedback Loop

The factor represented as Student Feedback Loop is actually made up of two forms of influence on the case participants and their relative efforts with technology. Both parts however are a derivative of how the technology efforts impact students. One part of the feedback loop is based on how the students respond (positively or negatively)

to the new technology being tried. The other component of the feedback loop is how the technology effort actually impacts student learning as perceived by the case participant. In both cases, the students' interaction with the technology generates a reaction that the case participant discerns and then factors into his or her decision as to whether it was a good experiment or not. I referred to this collective impact as the Student Feedback Loop because it requires interaction with the students and appears to occur in a repetitive or recursive manner between the case participant and his or her students.

Evidence of the first part of the loop (student reaction) was found among all four of the case participants. They frequently described how their students reacted to the various experiments with new technologies and how that influenced their willingness to put more time and effort into new teaching approaches. As a general rule, the more the participants tried new ideas and techniques involving technology, the more positively the students reacted to those efforts. The converse was also seen in which a negative reaction by the students tended to steer them away from that activity. The positive reactions of the students inspired the case faculty to turn around again and put more effort into even newer and more challenging activities with technology. Hence, the loop effect that I observed.

Direct student benefit in the form of improved learning outcomes was also reported repeatedly by all four case participants. For example, if students readily absorbed the use of wikis for group projects and resulted in better team reports at the end of the semester, then the case participant continued using it. If a fully online course better served the educational needs of remotely located students, then they pursued more online courses.

It is important to note however, that the definition of student benefits was rather wide and subjective in this analysis and was based only on what was reported by the case participants themselves. There was no quantifiable measurement of increased learning that was used to judge the value of a benefit. If the participant described a technology as helping students learn, then it was treated that way. From a study design standpoint, I consider the student feedback loop to be primarily an external (or extrinsic) factor because the influence is coming from an external source (the students).

Factor 4: Networking with Like-Minded Colleagues

A consistently reported influence on the technology activity of these faculty members was the positive effect exerted by networking with academic colleagues, particularly in discussions related to the use of technology in classroom instruction. The networking activities they described attending included targeted training sessions, conferences, and local user-groups. These networking experiences supported ongoing individual efforts as well as stimulated thoughts for new innovations to try.

An interesting facet to this was my observation that all four participants showed a consistent pattern of self-selection into attending these networking events and their participation was independent of the attitudes or cultures evident in their local academic units towards teaching or technology innovation. This disconnection between personal activity and departmental culture is discussed later in this section as another reportable factor.

It is worth noting that the selection of these participants into this study was, in part, a function of their appearance at many of these types of events organized by the teaching center where I work. For example, all four of the participants in this study

reported participating in various instructional technology fellowship and grants programs offered by the campus.

Factor 5: Campus Administration (Resources)

One broad area of external influence seen among faculty and reported in the literature is the campus administration and the extent to which it supports the personal efforts of these case participants in using technology in the classroom. (Note that this is separate from the perceived culture of the campus administration towards teaching and technology.) Forms of positive resources cited by the participants include basic infrastructure such as campus-wide learning management systems or standardized classroom configurations, ongoing training and support offered through the campus teaching and learning center, and grants to support instructional innovation in the form of fellowships and competitive research funding. The influence of campus administration was most clearly manifested in the form of teaching resources provided at the campus level.

It was very evident from the data collected in this study that when campus administration provides these kinds of resources to these faculty members it results in a higher degree of confidence and a more positive attitude toward experimentation with technology. One explanation of this could be that in providing resources, the sense of risk associated with technology experimentation reported by several of the case participants is mitigated. It could also be that these faculty members interpret the provision of these resources as an implicit endorsement by the campus administration of the use of technology. "If they spend all this money giving us ways to teach with technology, then surely they (the administration) must think it is a good way to invest our time?"

It is important to remember that all four participants in this study were drawn from a single institution thereby limiting the extent to which these observations regarding the influence of campus culture on use of technology could be extended to faculty members from other campuses with potentially different cultures. It may be that the results reported in this study are unique to the participants' campus—or they may not. A different study design involving multiple campuses could help address that question.

Factor 6: Money (Indirect)

The role of money as a motivational factor presented itself in an interesting way in this study. Other than with one participant (Susan Popham), there was no evidence among these four case studies to suggest that money in the form of direct compensation provides any significant motivational influence. They did not even seem interested in discussing the issue of personal compensation. On the other hand, money did emerge regularly as an important factor when it is used to purchase technologies or benefit the larger mission of their academic unit. For example, the role of money tied to developing a fully online program in one academic unit was clearly a strong positive influence on the participant's efforts with technology, but the benefit of that additional money was seen as positive only for the good of the department as a whole and not as compensation to the individual faculty member contributing to its development.

Thus, one strong finding from this study is that financial resources seem to be an important motivator only when used to provide resources to the department or institution. The term indirect is used to help describe this theme as a way to represent the indirect flow of the money and its resulting impact on the behavior of the case study participant. The money (reward) is generated as a result of effort by the participant, but the concrete

benefit derived from the additional income flows to the entire department for collective needs (indirect from the individual who generated the income). The resulting positive impact on behavior of the case participant is presumably derived from the intrinsic reward of helping others and not the direct reward of material gain.

The phenomenon of little positive influence related to direct financial gain is generally consistent with previous studies on worker motivation in other industries where compensation ceases to be effective beyond basic survival needs (Herzberg, 1959, 1962; Maslow, 1954). Note that the role of money in the form of direct compensation is further discussed as a theme later in this section of the study report.

Factor 7: Previous Experience with Technology

This factor (previous experience) and the next one (persistence) are likely interrelated at some level. The premise of these factors stems from my observation among these four participants of a strong pattern of previous experience with technology over an extended period of time. Additionally, for two of the participants, experience with technology during graduate school pointed to a strengthening of their current skills. Although they did not make an explicit connection between their graduate experiences and their current level of activity, they described their previous exposures as students in generally positive terms and in ways that appear to have enhanced their current levels of self-confidence using technology. In the case of two of the participants, one's graduate school experienced occurred long before the advent of instructional technologies while the other one did not offer evidence of prior graduate school experience working with technology.

Initially, I was tempted to treat this observation as age-related and strictly a by-product of the participant being in graduate school during the technology revolution. However, when I reconsidered this phenomenon instead as a reflection of long-term or previous experience with technology and teaching, I found a broader connection among the participants. For example, I noted that the most senior participant in this study (who had been out of graduate school decades before the technology revolution) presented evidence of strong interest in computers and their use in teaching stretching back over 20 years. By extending the concept of information technology to include magnetic-tape audio recording and radio broadcasting of lectures, one could argue that this most-senior faculty member may have exhibited the greatest level of previous experience among the four participants in this study.

Whether the phenomenon of previous experience with technology is the result of an inherent natural attraction on the part of the participant or merely happenchance (being in the right place at the right time), the evidence of this theme is relevant and merits being reported.

Factor 8: Persistence

This is the last factor reported under the category of positive impacts and is likely linked in some way with the previous experience factor. I observed among these four participants evidence of a very persistent nature regarding their innovation efforts with technology. Although they reported many challenges associated with their exploratory work, such as contrary departmental attitudes, difficulties being selected for grants, or even outright failures with certain technology experiments, they persisted through these roadblocks and found ways to overcome them. From what I observed, neither

organizational roadblocks nor poor outcomes appear to impede their overriding need to innovate.

A tendency towards pragmatism also seems to inform their persistence. Rather than trying to brute-force their way through roadblocks, they appeared to instead reflect on the experience and look for alternate mechanisms to keep moving forward with their innovations.

As with many of the factors reported in this study, it is difficult to measure the strength of this persistence on their overall behavior or to know if it is unique to these participants. It is also hard to determine whether it is tightly coupled to their technology investments or is simply an inherent aspect of their individual personalities that carries over to all their professional work. Nevertheless, it is an observed aspect among the four participants and appears to augment their level of innovation.

Factors That Showed No Impact

The following six factors (9-14) were explicitly included in the study as potential influences, but turned out to not present any significant evidence among any of the case participants to suggest an influence on behavior or attitude regarding teaching innovation and technology. Many of these candidate factors were included based on their presence in the literature. Other factors in this group were included based on my personal experiences as a researcher in the field of faculty motivation.

Factor 9: Departmental Culture

Although it did not appear in any of the literature I reviewed as a part of this study, I felt it was important to explore the possible influence of local departmental culture on faculty behavior and their motivation to invest in developing skills using

technology in the classroom. Faculty members continually interact with their departmental colleagues and chairs to discuss a variety of things including teaching-related activities. It seemed logical to wonder what sort of influences these interactions might have in the area of instructional technology.

From a methodological standpoint, the primary source of evidence related to the role of departmental culture was a structured interview with the participants' department chairs. This department chair interview was augmented with data collected from the participants themselves using targeted interview questions. (For the purposes of this study, I have assigned the term department chair to the study participant's immediate academic supervisor—whoever that might be. This clarification was necessary because one of the participants works in a new concentration within an existing traditional department. The most logical academic unit leader to interview in that case was the concentration program director rather than the department chair.)

Consistent evidence emerged to suggest that departmental culture has little or no actual impact on the behavior and attitude of highly motivated faculty regarding their use of technology in teaching. Basically, these four faculty members function independently from the local culture of their respective academic areas in terms of attitudes towards teaching innovation. They may, or may, not align in terms of the importance of teaching and the value of additional investments with technology; the faculty member's behavior is the same regardless.

Among the four participants, there was a very mixed picture of departmental attitudes about teaching innovation and effort. Some participants perceived highly negative attitudes among their departmental colleagues towards teaching in general and

technology in particular. (The word perceived is inserted here to emphasize that sometimes what the participant perceived was not the same as what their department chair expressed.) Other participants reported either neutral or mildly supportive attitudes by their department chair regarding teaching.

The department chairs frequently described themselves as "highly supportive" of the value of teaching in their respective units, but also reported exerting very little effort to influence behavior among their faculty. Some departmental leaders also expressed a perception that research productivity was the primary professional goal for advancement in their areas. In other words, the departmental culture among these four case participants is highly varied with respect to the value of teaching or professional reward linked to innovative uses of technology.

For example, one participant stated most emphatically "I would do it anyway!" when we were discussing a negative departmental attitude in his discipline towards using technology in the classroom. In the other three cases, the lack of clear and consistent departmental impact was evident in the variety of attitudes among the case participants and their respective department chairs. Sometimes the participants were in complete agreement with their chair and other times they were pointed in opposite directions. And in spite of these variations in attitude, all of the case participants consistently provided no concrete evidence to suggest that their activities with technology were impacted by their department chairs or the general culture of their department. Put more simply, among these four case participants, there was no correlation between the attitude of their department chair towards technological innovation and the participant's actual level of technology activity.

The provision of resources to support teaching with technology did emerge as a possibly supportive role played by the department. If the technologies were made available by the department, the innovative faculty member would try to take advantage of them. If on the other hand the department did not explicitly provide resources, the participants still found ways to pursue it on their own. It is important to note that such departmental investments were generally in response to pre-existing demand and were not purposefully established to alter behaviors. Thus it appears that departmentally-provided resources function in a more secondary (or indirect) way to modify the participant's behavior.

The department's general attitude towards teaching (unrelated to technology) was also explored. In at least two of the cases the department seemed to place a very high value on the teaching mission of the unit, creating a receptive environment toward any individual effort focused on student success. However, there was no apparent effort to proscribe how faculty should focus on teaching and student success. Student success is simply a recognized goal of the academic area and individual faculty members are free to pursue their own methods towards that objective. Some choose to do this with technology, while others rely on more traditional means.

The conclusion was that the pre-existing attitudes and efforts of these participants, relative to their technology innovation, are essentially unaffected by the prevailing departmental culture. A highly negative culture does not seem to slow them down and a more supportive climate seems to only function as a pleasant surprise and does not appear to materially increase their innovative effort. Yet, in spite of this variation in departmental influence, all four participants have shown very similar behavior patterns

regarding technology. Therefore, the most logical conclusion from this is that the net effect of departmental culture on their motivational context is minimal or non-existent.

Factor 10: Campus Culture

This factor focuses on the culture of the entire campus with respect to teaching emphasis and related professional rewards only, exclusive of any concrete actions taken by campus administration to provide resources through budgetary activities. I chose to consider campus culture and resource provisions from the campus administration to support technology innovation as independent factors. One of them is more explicit and concrete (resources provided) while the other is more implicit and subjective (culture). An additional reason for evaluating them separately was the fact that campus resource provisions were reported in the literature as providing a positive impact on participants' activities and I wanted to see if my participants saw things in the same way (previously discussed).

My findings related to campus culture were in many ways similar to departmental impact: there seemed to be little connection between the attitudes and activities of the individual participants and what they perceived to be the prevailing campus culture towards investments in teaching. This observation is based largely on statements made by the participants themselves reflecting what they believed to be the campus attitude towards teaching. While most participants expressed a perception that the campus culture generally did not reward investments in teaching, they also did not suggest anywhere that this perceived negative culture actually had any impact on their personal activities. In other words, their attitudes towards efforts with instructional technologies were unaffected by the actual (or perceived) culture of the campus towards teaching. It should

be noted that the strength of this theme is limited based on the fact that the only data collected to define the actual campus culture regarding technology was that of the participants and their department chairs. Nothing was gathered to attempt to validate their perceptions.

As a side-note to this discussion, I found it interesting that there was frequently a distinct difference between the participants and their department chairs with respect to their perception of the campus attitude towards teaching. On the one hand, the participants were almost universal in their perception that the campus culture put little emphasis on teaching activities. Their department chairs, on the other hand, expressed a generally opposite view (that the campus places a positive emphasis on investment in teaching.) The confusing nature of these contradictory perceptions is significant as it highlights the autonomous nature of research faculty and points to the difficulties campus leadership faces in communicating with individual faculty or implementing activities intended to affect behavior.

Factor 11: Money (Direct Compensation)

It would have been very difficult to conduct a thorough study of worker motivation without considering the role of money in the form of direct compensation as a mechanism to influence behavior. It is important to note that, in this study, direct compensation is treated as distinct and separate from money related to increased tuition and fee income for the benefit of the academic unit as a whole. This discussion presents my findings regarding the influence of money as a direct reward in response to extraordinary efforts by individual faculty using instructional technologies.

What emerged suggests that money in the form of direct compensation to the individual faculty member played a generally minimal role in effecting the behaviors or attitudes for three of the four case participants. Similar to some of the other factors that I considered non-affecting, the evidence that direct compensation had no effect appeared both directly in statements by the participants and indirectly in what was not said. For example, on multiple occasions throughout the data collection, I probed the participants for direct reaction to questions about the value of compensation as reward for their additional contributions. Other than in the case of Susan Popham and her need for summer pay, what I received was little to no affirming statements to suggest that personal reward has any influence on their choices of activity. Instead, what I did hear were multiple statements suggesting that money for the general benefit of the department and its teaching mission did have strong value. (See the related factor in this section on money in an indirect form.) Thus, the evidence in this study suggests a weak relationship, at best, between money as compensation and higher levels of technology innovation.

Factor 12: Career Stage

One goal of this study was to explore the possible influence of career stage on the motivational behavior of research-oriented faculty with respect to effort with instructional technologies. For the purposes of this study, three career stages were considered: (1) pre-tenure, (2) post-tenure, and (3) late career. I have already noted that the four case study participants in this study were carefully selected to include all three of these career stages (one was pre-tenure, two recently tenured, and one had achieved tenure over 25 years prior to the study.)

Like several other findings in this study report, the most useful way to consider this question is not what appeared in the data, but what did not appear. In other words, there was very little evidence to suggest that career stage has a material influence on teaching innovation for faculty members who are already highly motivated. The most obvious place where this issue could impact faculty behavior is for those who are on tenure-track, but have not yet attained tenure. This concern is especially relevant on research-oriented campuses where failure to reach designated research output is likely to result in a failure to achieve tenure and where the general perception is that teaching success holds a distant secondary position relative to research activity. Even for those who have earned tenure, continuing to progress professionally is largely a function of maintaining a healthy level of research and not generally based on exceptional accomplishments in the classroom. In this light, it would be logical to assume that the pressures to maintain a high level of research productivity would degrade attitudes and activities towards innovations with technology in teaching (which can require significant investments of time and attention.)

Instead of confirming this theory, the results of this study suggest that research expectations do not degrade attitudes or effort towards teaching innovation among high users of technology. This observation is strengthened by the fact that the study included representatives from all three categories of career-stage (pre-tenure, post-tenure, late-career), and yet none of them reported anything to suggest that their attitudes regarding technology innovation have been affected by their career stage. Nor did any of the three post-tenure participants provide any evidence to suggest that their relative level of innovation with technology was any different during their pre-tenure period than

afterwards. This phenomenon was perhaps most evident with the participant who had achieved tenure back in the early 1980s whose level of enthusiasm regarding technology and innovation rivaled that of the other three participants who were much younger as well as at much earlier stages in their careers. Therefore, based on evidence from these four case studies, it is reasonable to suggest that faculty members who exhibit a high level of motivation regarding technology continue to do so independently of their professional career stage.

Factor 13: Research Expectations and Balance

Also explored in this study was how these four faculty members approach the challenge of career-balance on a research-oriented campus. In other words, how do they ensure that their extra effort in teaching innovation does not adversely affect their research or service productivity? (While it is being reported separately, it should be noted that consideration of research expectations overlap—in both context and results—with the previous discussion regarding career-stage.) Given that three of the four participants had already achieved tenure under research-oriented contracts, it was reasonable to conclude that they had been successful at some level in achieving the proper balance. Thus, a question I wanted to address in this study was—how were they able to do both successfully?

Many researchers (Bess, 1977, 1997; Blackburn & Lawrence, 1995; Boyer, 1987, 1990; Fairweather, 1996; Huber, 2004; O'Meara & Rice, 2005; Rice, 1991; Schuster & Finkelstein, 2006) have previously reported on the relatively low value placed on teaching effort on research-oriented campuses. In such an environment, it would not be

surprising to see a degradation of attitude towards investing extra effort into learning and using new technologies for teaching purposes.

Like many of the conclusions coming from this study, the question of balance also provided interesting findings: none of the data gathered from the three post-tenure participants suggested that concern over research output impacted their efforts with technology. Instead of making either/or choices about use of time, they found ways to cross-share (i.e., double-dip) their teaching innovation efforts such that they ultimately benefit their research and teaching (or service) missions simultaneously. This clever approach, whether consciously or unconsciously pursued, allow their teaching innovations to not only avoid conflicting with their research mission, but even to positively impact it.

Factor 14: Age

When considering the various factors that could potentially affect attitudes and behavior with technology, age is something that is frequently discussed. A common notion is that younger faculty members are naturally more inclined to experiment with technology and that older faculty members, being exposed to technology much later in life, tend to stick with traditional non-technical teaching techniques.

In this study, I gathered no evidence to confirm the notion that advanced age substantially degrades attitudes or behavior related to technology innovation. On the contrary, my observation was that the engagement and enthusiasm that all four participants showed in regard to their uses of technology was consistently high across their wide range of ages. Moreover, the very existence of a late-career participant in this study supports my observation that age is not a consistent predictor of technology

adoption among faculty. Further evidence of the non-universality of age-related avoidance of technology is evident in the fact that the original pool of potential case study candidates considered for this study included several highly innovative faculty members who were past the age of 60 with some approaching 70 years of age.

An obvious limitation to this general conclusion is the subjective way in which I made these observations regarding relative attitudes among the four participants. I did not attempt to directly measure levels of enthusiasm or expertise among the case participants. A qualitative study that includes the evidence of a single late-career individual certainly does not reflect the entire population of late-career faculty across all institutions. But it is not unreasonable to conclude from this study that being at an advanced professional age does not universally predict low motivation or aptitude regarding contemporary technologies in teaching.

Prioritization of Reasons to Innovate

In the third interview with each of the four case participants, I conducted an exercise in which I provided them with a list of five words or phrases representing why a faculty member might try a new form of technology in teaching and I asked the participant to rank them. Part of my reason for conducting this exercise was to further explore results from analysis of earlier interviews (a form of member-checking) and also as an attempt to validate some common themes that I believed were emerging from the cross-case analysis (a form of triangulation). Table 9 (Participant Ranking of Reasons for Using Technology) provides a summary of how three of the case study participants completed this exercise. (The ranking outcomes of the first case study were omitted as

the result of modifications and improvements to the scale I determined were needed based on the outcomes of that initial ranking exercise with him.)

What stood out in the results of this ranking exercise is how consistently they put student needs at the top of the list. The results of this exercise are insightful in recognizing the extent to which addressing student needs functions as a foundational driver to their activities with technology. This is also consistent with the Student Feedback Loop factor that emerged from the cross-case analysis.

Table 9

Participant Ranking of Reasons for Using Technology

Most Important	Curry	Gootzeit	Popham
	Student Benefits	Student Benefits	Student Benefits
	Increased Productivity	Fun	Increased Productivity
	Fun	Personal Fulfillment	Fun
	More Orderly	Increased Productivity	Personal Fulfillment
Least Important	Personal Fulfillment	More Orderly	More Orderly

Summary of Results

After analyzing the four sets of case study data, a total of fourteen (14) individual factors were identified. These factors (specific forms of influence) fell into two broad categories: those that created an increase in technology activity by the case participants and those that did not appear to have any impact on behavior (non-influential factors). It is also noteworthy that there were no negative factors (reduction in technology activity) that emerged from the analysis of these four case studies.

The second group of factors (no observable impact on activity with technology) came from one of two sources: they had been examined and reported in previous studies or I explicitly included them in the study as a means of addressing the research questions included in the overall design. The first group (increased activity with technology) came from two sources as well: those that were explicitly built into the study design and those that were previously unknown to me and originated from the analysis of the data collected in this study.

This set of newly-identified positive-impact factors were of particular interest to me as a researcher and included almost all of the themes in the top group from Table 7 (positive influences) except for two—intellectual curiosity of the faculty member and resources provided by the campus administration. All of the other positive-impact factors were not previously reported in my study of the literature on faculty motivation and should be of particular interest for additional study.

Those that presented no discernable impact (Table 8) were also interesting. Some of them had been previously explored and the results of this study were generally consistent with previous reports. Others were unique to this study and there were no

background results for comparison. What was particularly interesting to me was that so many potential sources of influence presented no discernable impact on the behavior of these four case study faculty members.

To recap: none of the following were found to significantly modify the behavior of the four faculty members in this study: departmental or campus culture, advanced age, money as direct compensation, career stage or research demands. These are all prominent components in the environment in which research faculty work and yet none of them seem to affect the extent to which these four faculty members invested in the exploration of technology for their teaching.

The relevance and meaning of all of these findings are explored further in the concluding section of this study report where they are used to help address the research questions I set out to answer in this study.

Chapter 5: Conclusion

In this study I investigated the motivational factors that influence the teaching activities of faculty and their use of technology at a research-intensive institution. I set out to pursue this line of investigation through four case studies of individual faculty members who exhibited an exceptionally high level integration of technology into their teaching activities. In this investigation, my aim was to attempt to shed new light on the various intrinsic and extrinsic motivational factors that influence the extent to which these four individuals pursue their use of technology in teaching at a higher level than most of their colleagues within their departments and across the campus. Put in more simple terms, I endeavored to understand why these particular faculty members put so much into their efforts with instructional technology as compared to many of their peers.

It is important to note that it was not the aim of this study to compare, contrast, or otherwise gauge the quality of their teaching, assess learning outcomes, or otherwise attempt to assign a quality attribute to the teaching work of any of these four case participants. The notion of learning outcomes associated with various teaching treatments (including instructional technologies) is a wide field of study and not one I considered in this research. The scope of this study was restricted to only the exploration of motivational factors associated with the personal choices of these four faculty members regarding the time and effort they invest in technology related to their teaching activities.

As implied in the design of this study, faculty members at research intensive institutions separate into many levels of technology use along a continuum from "extremely little or none" to "technology leaders among their peers." Within any population of higher-education faculty, some of them will aggressively explore these new

tools, while others are more timid. Some even appear to avoid adopting technology entirely and may be referred to by their colleagues with unbecoming terms such as luddite or technophobe. Stories are occasionally exchanged on campuses about faculty members who still today, when we are well into the 21st century, continue to refuse to use even email to communicate with their students. But within this wide range of faculty attitudes towards adopting technology in their teaching, many of them continue to press aggressively ahead innovating with even more technology.

Summary of Findings

The motivational factors examined in this study were divided into the following broad areas: (1) intrinsic versus extrinsic drivers, (2) the role of departmental and institutional culture, and (3) potential variances by gender, age, and career stage (pre-tenure versus post-tenure versus late-career). Additionally, the study included a component that could be especially relevant on a research-intensive institution: to understand how these highly innovative faculty members are successful (or unsuccessful) at balancing the need to be productive as research scholars while still investing heavily in the use of technology related to their teaching.

In the following section, I address the five primary research questions using the analysis results as a basis for each question discussion.

1. What are the relative roles of intrinsic and extrinsic motivational factors with respect to a faculty member's investment in new skills related to the application of instructional technologies?

The most prominent and perhaps the most intriguing finding that emerged from this study was the dominant role played by intrinsic motivational factors in governing the

behavior of the case study participants. While a variety of other external or demographic factors were explored, with some of them providing varying levels of impact, the influence of intrinsic factors was the most dominant.

I have identified four discrete intrinsic factors that emerged from the faculty participants in this study: (1) inherent interest in teaching, (2) benefits for student learning (3) intellectual curiosity/fascination with technology, and (4) competitiveness/differentiation. I found evidence of the influence of the first three of these factors (interest in teaching, student benefits, and intellectual curiosity) among all four case participants. The fourth factor (competitiveness/differentiation) was exhibited only by the male faculty members in the study.

Upon further evaluation of these four factors, I decided to group them into two categories: personality-related factors and teaching-centric factors. Within those two broad groupings, I identified additional sub-groupings as summarized in Table 10.

Table 10

Identified Intrinsic Factors

Category 1: Personality related
• Intellectual curiosity & fascination w/technology
• Competitiveness & differentiation
Category 2: Teaching-centric orientation
• Student learning/benefits
• Inherent interest in their teaching role

The first category (personality related) represents characteristics of these faculty members that are likely deeply engrained in their personalities and might even be independent of their roles as faculty members on a college campus. In other words, being curious, competitive, or driven to differentiate are personality traits that seemed to carry over into many other aspects of their lives beyond their role as faculty members. The second category of factors (teaching-centric orientation) appears to be tightly coupled with their professional role as faculty members. It would be more difficult to express their desire to teach were they unemployed or working in a non-faculty job in industry or government. One could also theorize that they self-selected into the faculty member career path because they had a pre-existing internal drive to teach. This study did not address that possibility.

I also considered a number of extrinsic factors in this study including money, departmental culture, and institutional culture, with each of them exhibiting varying degrees of observable impact on the behavior of the four case study participants. Money is discussed below while the influences of the department and campus administration encompassed their own research question and are covered under that topic later in this section. It is also important to remember that a variety of other external factors were explored that did not exhibit any influence on the four case participants. A recap of those non-impacting external factors is also covered below.

Money

The role of money as a potential motivator appeared in this study in two forms: (1) as direct compensation to the contributing faculty member and (2) indirectly in the form of resources to support the teaching mission of the academic unit. In the first form

(direct compensation), money appears to play a minimal role—at best—in terms of influencing faculty motivation and behavior. There was only scant data from one case participant ("to earn summer grocery money") to indicate that personal financial reward played any role in his/her attitudes and activities. On the other hand, when money is considered in the form of acquiring resources associated with teaching (technology infrastructure, faculty support, etc.), it appears to provide a tangible boost to the level of technology innovation that these faculty members pursued. This indirect impact of money was particularly evident when the participant talked about the opportunity presented by new fully online programs to generate additional tuition and fee income to the benefit of their academic areas. But, this indirect money impact appears generally limited to be a layering on effect to a pre-existing positive attitude, not a foundational component of their motivation with the exception of summer pay opportunities cited by one participant.

Thus, while money plays a definitive and positive role in increasing faculty motivation and activity with instructional technologies, its effect appears limited to augmenting a pre-existing positive attitude and is most influential when applied in the form of indirect support and not as direct compensation. This finding is consistent with the literature on the role of money for faculty behavior and motivation (APLU-Sloan, 2009b).

External Factors Not Showing Impact

In addition to external factors that showed a positive impact on their behavior, there were some that did not present any obvious impact on their behavior. Among those other factors not shown to exert an influence on faculty motivation were: personal or professional gain and time savings or efficiency. One might theorize that external

recognition in the form of campus-wide awards or professional advancement might influence faculty behavior towards technology in their teaching. Similarly, the opportunity to spend less time and to function more efficiently overall in their teaching activities might be an additional draw towards instructional technologies. Efficiency and time savings are frequently selling points for use of emerging technologies in the workplace. In the case of the four faculty members in this case study, however, there was essentially no evidence presented to suggest that such potential benefits exert any observable influence on their behavior with respect to technology innovation.

It may be that they are actually benefitting from these potential influences—or they may not. This study did not gather data to help answer that question. Even if they are experiencing these potential benefits, these four faculty members did not present any evidence to suggest that they provide any influence on their motivation.

Another interesting outcome from this study was the complete absence of any observed negative influences on their use of technology. I did not recognize this fact until after I had completed the data collection and finished the majority of the analysis. At this point, I have no solid explanation for the lack of observable negative influences.

2. In what ways do faculty members balance the introduction of new instructional technologies into their overall set of professional responsibilities (research and publication, service, teaching, etc.)?

It is widely understood that balance on a research-intensive campus generally means building a very strong level of research productivity in combination with acceptable results in teaching and service in such a mix the faculty member is able to achieve tenure and grow professionally. In other words, balance does not imply equal

weight, but instead is a function of being able to achieve very demanding research expectations while simply avoiding negative marks on other areas of responsibility. In this professional environment, being particularly strong in teaching and service does not provide significantly more professional advancement opportunity over merely achieving acceptable levels in those two areas of responsibility. None of the data presented by the case participants in this study offers anything to contradict this generally-held belief.

Although absolute measurement of scholarly output was not a goal of this study, all of the case participants provided hints in the data to suggest that their scholarly output was not materially diminished by their higher investments in technology. This was indirectly corroborated through their department chairs who offered little evidence to suggest a reduced perception of the overall professional success by each of the selected case participants. Rather than diminish their professional standing in the eyes of their leadership, several of the case participants were described in very positive terms regarding their professional achievements.

Another balancing technique exhibited by these faculty members was what I came to refer to as *double-dipping*, in which their technology efforts generate multiple professional benefits. In addition to the teaching benefits, their technology efforts were frequently structured to complement their research mission or generate service contribution to their department (developing new online programs to attract new students).

Explaining why these case participants are able to achieve such balance is an interesting question, but there is probably a high correlation between motivation, diligence, and overall professional success among the general population of faculty

members at the college level. It is also reasonable to theorize that the faculty members included in this study would show up on a campus list of successful or productive faculty on any of a variety of measures. As has been seen in the data, workload balance with these four case participants is achieved in a variety of ways. But, the most important thing to note is that they are able to strengthen, not weaken, their research activities while still being very active with technology. With these case participants, choosing between research and teaching is not a zero-sum game where putting more into one takes away from the other, instead they are able to do both successfully.

3. Do demographic factors (gender, age, etc.) influence faculty investment in the use of new instructional technologies?

Two primary demographic factors were evaluated in this study: age and gender. Consideration of these two factors was accomplished by ensuring proper representation among the case studies of both genders and a broad range of ages. The following paragraphs summarize the findings of this study with respect to both of these demographic characteristics among the participants.

Age

Put in succinct terms, there was no evidence presented in this study to suggest a variance in relative technology motivation based on the age of a faculty member—at least for faculty members who exhibit a high degree of technology motivation in general. The faculty members in this study group ranged from late 30s to nearing retirement age, yet there was little or no discernable difference in attitudes towards technology among the four individuals.

This lack of age variance on attitudes regarding technology in teaching runs counter to many anecdotal suggestions that technology orientation is correlated with age. In other words, the commonly held perception is that technology comfort is a behavior largely reserved for the younger generation and that older faculty members are more likely to rely on traditional, non-technology based teaching methods. In considering such a theory regarding age-related preferences among faculty, it is important to be reminded that this study focused entirely on attitude and motivation towards technology and did not attempt to measure or contrast absolute levels of skill, aptitude or sophistication. So while variances of absolute skill level with technology might exist among divergent age groups, this study was looking only at attitude and time investment.

On the other hand, the findings of this study are very consistent with recent studies that have found little variance in the level of faculty participation in developing and teaching fully online courses across all age groups (APLU-Sloan, 2009b). Faculty members with over 20 years of teaching experience have been shown to be just as likely to develop and teach fully online courses as those with only 6 to 9 years of teaching experience.

Based on the results of this study, anecdotal observations that older faculty are more likely to shy away from technology in the classroom could possibly be explained as being related to lower skill levels and self-confidence rather than a lack of interest. As expressed by the participants in this study, using technology in the classroom brings along significant risk and opportunity for failure, and few professionals, particularly research faculty, enjoy failure in their work. It is also reasonable to conjecture that older faculty members have had less relative exposure to technology across their entire careers

than their younger counterparts resulting in a lower level of developed skills and related confidence in attempting new techniques involving technology. Other studies would need to be conducted to test these theories.

Also evident among the faculty members in this case study is that highly motivated and innovative individuals do not appear to pop out of nowhere. Such faculty members do not simply emerge from a cocoon immediately competent at a high level with technology. Instead these case participants provided evidence of long-term exposure to technology. This long-term exposure gave them a greater opportunity over a longer period of time to develop the necessary skills for a higher level of both competence and confidence. The theme of long-term exposure as a contributor to motivational attitudes was previously discussed in greater detail in the results section of this study report.

Ultimately, this may be a "chicken and egg" issue. Given that intrinsic motivation appears to be the dominant factor among these case participants, the question arises: did they start using technology early on because of their curiosity and self-confidence or did their curiosity and self-confidence stem from an early exposure to technology? The results of this study leave that question unanswered. Perhaps, a follow-on study design might further clarify the interrelationship of age, aptitude, and attitude vis-à-vis technology and teaching.

Gender

As I presented in the background literature portion of this report, very little is known regarding the relationship between gender and the motivation to use technology in teaching. An effort was made in this study to explore gender through the inclusion of both male and female case participants as a way to possibly expose differences between

the two gender groups regarding their attitudes towards technology. What I ultimately found is that exploring gender-related factors in professional activities is a challenging and nuanced task.

Perhaps it was a function of the study design or perhaps it is indicative of real conditions, but analysis of the data collected in this study did not reveal anything significant to indicate differences in motivation to use technology as a function of gender. Some evidence from this study hinted that females might be more nurturing and males more challenging with their students, but much more effort in study focus, design, and execution would be required to shed any definitive light on that possibility. The only thing I can say with confidence from the findings of this study is that there does not appear to be an observable difference regarding motivation towards technology between male and female faculty members.

4. To what extent do career-stage factors (pre/post tenure, retirement, etc.) influence faculty investment in the use of new instructional technologies?

The results of this study provided no evidence to suggest that the propensity to invest time and effort into technology innovation is affected by tenure stage. In other words, pre- and post-tenured faculty members exhibit equivalent levels of activity innovating with technology—at least for faculty members who already exhibit high levels of motivation with technology. This phenomenon appears to continue at even more advanced stages of professional achievement, including senior-level professors who earned tenure even decades in the past. Such behavior flies in the face of many generally-accepted beliefs regarding the interplay of tenure-stage, professional advancement, teaching investment, and research productivity among research-oriented faculty

members, with the assumption being that the pressures of achieving academic tenure function to suppress investments in teaching. The following are some possible explanations of the observed contradiction in this study towards these widely-accepted beliefs.

Perhaps these faculty members are already successful in leveraging their technology innovation effort to support and enhance their research activity (as discussed elsewhere in this report). Perhaps the high degree of productivity that they have shown simply illustrates that they have the capacity to perform at a high level in multiple areas simultaneously. These faculty members could also be positively affected by local departmental cultures that encourage (or at least do not discourage) behavior patterns in support of high levels of student success. A final and perhaps more simple explanation could be that what drives them intrinsically (competitiveness, curiosity, student achievement) is so powerful that these individuals cannot restrain from investing in teaching innovations, regardless of the potential adverse consequences. Exploring this phenomenon in greater depth is worthy of a follow-up study.

Clearly the results drawn from a small number of faculty members in a qualitative study such as this would not necessarily represent those of the faculty population as a whole. On the other hand, the lack of evidence from this study to suggest that the propensity to excel with technology is in any way affected by career stage is intriguing and indicates a more in-depth quantitative exploration might be worthwhile.

5. To what extent do departmental or institutional cultures influence motivational behavior with respect to the use of instructional technologies by individual faculty?

Among the variety of possible motivational factors considered in this study were the following two: (1) those of the department, both through its leadership and culture; (2) the entire institution, as represented by the administration and actions it takes to support teaching as well as the perceived culture of the entire campus towards technology innovation. The following two topics discuss the findings from this study regarding those two factors.

Departmental Culture and Its Influence

Regarding the question of what potential impact departmental culture has on the behavior of innovative faculty, the results of this study are that it exerts a minimal or perhaps non-discernable impact. The results reflected a wide range of departmental cultures among the four participants regarding the professional value of teaching and innovation with technology. For example, the attitude regarding students and teaching among the four departments represented in this study ranged from enthusiastic and central to the department's mission to mildly supportive, but secondary to its research culture.

In terms of the departmental culture and the impact of leadership within the unit on the faculty members, there was also an interesting dichotomy that appeared between the perceptions of the case study participants and their academic chairperson. In three of the four cases, the department chair expressed a strong individual belief that they personally did an effective job of conveying a strong endorsement of teaching and learning among the faculty in their respective academic areas. However, the exact opposite view of departmental leadership's influence was held by the individual case

participants themselves. The participants' general view was that departmental leadership and culture is either antagonistic to their innovations or simply silent on the matter.

As a point of accuracy on this observation, the dichotomy of views is not whether the faculty participant and leadership see the value of teaching in the same way, but rather the extent to which departmental leadership is able to influence faculty attitudes on teaching. Put more simply, the department leaders think they are communicating a message regarding teaching activity, but the message is not being heard, at least among the faculty members included in this study.

Campus Administration and Culture:

Similar to the departmental question, the influence of campus administration and culture on these case study participants presents some interesting findings. Both presented contradictory perceptions of impact between the individual case participants and their department chair. While the department chairs' attitudes were not a central focus of this study, the differences in perception between them and the case participants were interesting and obvious enough to merit reporting.

A discussion of the role of campus administration first requires dividing its impact into two broad categories: (1) campus-wide culture and the influence of top-down communications and (2) provision of resources to support technology innovation. Based on the analysis of the data in this study, the campus administration influences perceptions and behavior at varying levels across both of these broad categories.

In terms of the cultural orientation of the campus towards technology innovation, there appears to be a distinct difference between the perceptions of the individual faculty members and those of their departmental leadership. While the departmental leadership

interviewed in this study consistently told of hearing a clear message from institutional leadership regarding teaching effectiveness and encouragement to use technology, the individual faculty participants did not. Not only did the individual faculty case members not provide evidence to suggest an alignment with their departmental leadership regarding direction from the campus, they sometimes even offered contradictory statements regarding the attitude of their campus towards technology innovation. I saw this repeatedly in the data. In other words, the department chair would describe of hearing one message from campus administration and the case participant would describe hearing something different or entirely opposite from the same campus administration. An explanation for this variance was not evident in these results, but they do hint at a need for campus leadership to examine closely the mechanisms by which they communicate to the rank-and-file faculty population and how they collaborate with departmental leadership to convey messages to faculty.

One area of institutional impact where there was strong alignment between the case participants and their departmental leadership was in the positive influence of teaching resources provided by campus administration. Both the participants and their chairs provided strong evidence to suggest that through the provision of campus-wide resources (funding for technology, training, support, etc.) campus leadership exerts a tangible and positive influence on faculty behavior. All four case participants and their departmental leadership provided multiple instances of evidence consistent with this alignment of perception.

In summary, while campus leadership may be failing to directly influence faculty behavior because of ineffective or inconsistent communications, they seem to be

indirectly getting the message through to both individual faculty members and departmental leadership by providing the financial underpinning necessary for technology innovation.

General Discussion and Future Studies

While the results of a qualitative study such as this one are not designed to be generalized, they can be very useful in a number of ways. In the following discussion, I will present some ways in which the results of this study may be useful to campus leadership when considering ways to increase faculty members' use of technology in teaching. Following that discussion I will offer some potential follow-up research suggested by this study.

Implications for Campus Leadership

The results of this study suggest that commonly-held beliefs regarding the interplay of age, tenure-level, and research productivity with respect to investments in technology and teaching innovation should be re-examined further. Throughout this study, evidence was presented to contradict anecdotal perceptions in these areas.

Another interesting observation from this study is that older faculty members should not be automatically excluded from technology oriented campus initiatives based on their age or career-stage only. In fact, it may be that they are excellent candidates for exploring new technology-based approaches precisely because they can afford the professional time required to develop new skills and teaching materials.

Further, campus administrators who are interested in influencing faculty behavior and attitudes related to adopting more technology in their teaching need to think carefully about how to reach those faculty members and communicate their message more

effectively. The widely divergent perception between the participants and their chairs regarding administrative encouragement of teaching innovation suggests that many faculty members either are not likely to take direction from campus leadership or at that they are not paying close attention when messages are conveyed. Furthermore, this study suggests that individual faculty members are not likely to be affected by cultural considerations or direct management efforts even within their own academic units. The results of this study suggest that directives from campus or departmental leadership do not appear to get through to rank-and-file faculty members.

On the other hand, we have seen evidence of a tangible and positive influence on faculty behavior through campus and departmental leadership when it comes in the form of funding to provide technology and support resource. Campus and departmental leadership interested in increasing faculty activity towards technology innovation might find more success by emphasizing these indirect channels to the faculty community.

Perhaps such intrinsically-motivated faculty members like those included in this study are a potential resource as emissaries for influencing campus-wide behavior. Once identified, they could be nurtured and given responsibilities to help influence the attitudes and behavior of their less-motivated colleagues. Developing mechanisms for identifying and utilizing such highly motivated faculty could be a desirable goal for campuses that wish to influence general faculty attitude towards teaching innovation.

Although it was not a central focus of this study, evidence emerged that illustrated the extent to which successful users of technology-centric teaching methods provide a positive and cascading affect within their academic areas. The faculty members in this study reported regularly participating in both formal and informal technology-oriented

networking activities. Their department chairs also described how they provided informal assistance to other faculty members within their academic areas. These peer-support activities could possibly be formalized as a way to increase acceptance and use of technology among faculty members. Should such mentoring arrangements be pursued, care should be taken to ensure that any explicit efforts to use their time in such ways for the greater good of the campus would not adversely affect their academic and professional standing. For example, contributions in this way could be rewarded through reduced teaching loads or positive marks in their tenure and promotion reviews.

Additional Research

In addition to providing a better understanding of what influences impact the level of technology innovation among the four case participants, this study also generated a number of new questions. In the next discussion, I present four follow-up studies that would be useful in extending the value of the results presented in this study.

Future Study 1: Same Study/Different Class of Faculty

Conducting a similarly designed qualitative case study using faculty members who do not show a high level of investment in teaching with technology could provide some understanding why they are less inclined to innovate in the classroom. It might also be informative to conduct similar explorations of other distinct populations of faculty, including full-time faculty from non-research institutions (both two-year institutions and 4-year liberal arts institutions) or part-time adjunct faculty members. Comparing and contrasting the results from an evaluation of faculty members from a variety of campus environments and with different levels of activity with technology could help develop a more complete picture across the general faculty population.

Future Study 2: Further Exploration of Identified Intrinsic Factors

The role of intrinsic factors (intellectual curiosity, differentiation, competition, student needs) stood out in this study. More in-depth explorations of those factors could be useful in addressing questions such as: Are there other significant intrinsic factors that influence faculty motivation that did not turn up in this study? Do the intrinsic factors that emerged among these four case participants influence other highly motivated faculty members? By how much? What about faculty members from other populations?

Future Study 3: Further Exploration of the Role of Departments and Campus Administration to Influence Behavior

Another area of potential exploration that stood out in this study was the muddled nature of the role of the department towards faculty and their teaching activities. The role of campus leadership and culture stood out in a similarly complicated way. More in-depth studies that focus on the role and influence of departmental and executive leadership could be helpful. To the extent that institutions have a need to manage their faculty population towards a particular behavior pattern, understanding how individual faculty members interact with existing campus hierarchies would be relevant.

Future Study 4: Faculty Motivation Profiling Instrument

Ultimately, it could be very useful to design a survey instrument that identifies other highly-motivated faculty members who fit a similar profile to those included in this study. In this way, campus leadership could more accurately identify faculty members to invite to participate in technology-oriented activities or who might assist others across the institution. Taken further, given the rapidly-increasing role of technology in the teaching mission of higher education and the need to maximize faculty engagement in that effort,

anything to assist institutions in developing a faculty population that is both motivated and productive in such an environment would be helpful. The results of this study have provided some useful guidance for other, more focused efforts towards that goal.

Significance for Institutions

While a fair amount of work has been reported on distance education activity and other things related to faculty use of technology (refer to Chapter 2), there are still many unanswered questions about how and why individual faculty members choose to set aside time from their other professional activities (especially research) to learn how to use a growing variety of technologies in their teaching. The purpose of this project was to learn more about those faculty members who put more into technology and teaching relative to their peers.

As I stated at the outset, the purpose of this study was not to attempt to ascribe a value of good or bad to any faculty member regarding their teaching skills or use of technology. I should also point out that there are certainly many ways in which effective teaching and learning can take place in the complete absence of technology. Indeed, it is a fair statement to say that college faculty members were able to reach students and generate good learning outcomes long before the advent of YouTube or MySpace.

However, as we move further into the 21st century, the business of higher education will most certainly become more dependent on the use of technology in teaching. For example, online teaching is no longer a side-business, but has become a standard requirement for institutions needing to serve an increasingly technologically-oriented student body. In the fall of 2007, almost 4 million students were enrolled in fully online courses at colleges or universities in the United States—a 100% increase since

2003 (APLU-Sloan, 2009a). And with one in five active students in 2007 reporting that they have taken at least one fully online course (APLU-Sloan, 2009a), there is even greater pressure on institutions to provide incentives and support resources for enough faculty to serve this growing teaching need. Now with the announcement of new and "exciting" educational technologies becoming a regular event (NMS-ECAR, 2009; NMS-ECAR, 2010), the challenge for individual faculty members to keep up will be ongoing.

For campuses to succeed at encouraging more faculty members to recognize the professional reward for investing time in learning these technologies, institutional leadership needs to be clearer in how it views the importance of technology in teaching. A 2008 survey of 188 public universities highlighted the need for greater clarity finding that while over two-thirds of their Chief Academic Officers recognize that online learning is a strategic objective, less than one-half of them actually include it in their strategic plan (APLU-Sloan, 2009a). This same study also noted a number of wide gaps between the administration and faculty regarding time investment, tenure and promotion, and basic compensation models related to faculty participation in online programs (APLU-Sloan, 2009a, APLU-Sloan, 2009b). It seems evident that campus leadership still has work to do in creating the right environment for more members of the faculty community to choose to participate in technology-centric activities.

From a practical perspective, the purpose of this study was to shed additional light on a subset of the faculty population that has already embraced technology in the classroom. By better understanding what makes such faculty members pursue these innovative activities in the absence of obvious professional reward, campus leadership will be in a better position to encourage more to move in the same direction.

Final Thoughts

These four faculty members were selected as participants in this study specifically for attributes and behaviors that set them apart from their peers. Simply put, they are frontrunners in the area of technology integration in teaching. This study has highlighted that, while they are pursuing something that is intrinsically rewarding, it is also time-consuming and thereby potentially risky for their professional advancement in other areas. In this report, I have presented a number of potential explanations for their unusual behavior and, after a year of time with these individuals, I have arrived at some general observations about the case study participants as a group.

These four individuals appear to not be afraid of technology; it does not intimidate them as often is the case with many faculty members. Instead, these four individuals embrace it as a natural component of their teaching and not a hurdle to overcome. Because technology is not mysterious or intimidating to these faculty members, they are very comfortable working with it. It may be that they are not more motivated than their peers, but simply are less impeded by fear or lack of aptitude. Additional research might answer that question.

I do not believe that they consciously think "I'll put a lot more technology into my teaching." Instead, they embrace teaching as a highly rewarding activity and are constantly looking for ways of getting better at it. Because their technology skills are so well developed, they just naturally gravitate to using it in their teaching activities. They do not set out to be exceptional with technology—they just want to be better at reaching their students. And, because they find it is highly beneficial to their students, they remain continually "on the hunt" to find new technologies to try.

The participants in this study like to teach, they respond positively to the feedback of seeing their students succeed, and they are naturally curious about technology. When the campus administration provides them with adequate tools and support to use technology, they feel more comfortable using it. Their departments are effectively irrelevant to their individual interests in technology, but as long as the department leadership stays out of the way, these case participants simply pursue technology more aggressively. The challenge for higher education is to create an environment that supports more faculty members to see technology in a similar way.

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Appendix A: Competency of Researcher

Central to the rigor of this study is the cultural competency of the researcher to integrate with and observe with clarity the activities of the faculty case-study participants. Below are professional characteristics of the primary researcher to support a position of cultural competency in this study:

a) Over 25 years of professional experience interacting with well-educated white collar workers in a wide variety of industries and organizational settings.
b) Extensive formal training in an industrial setting on the art and technique of interviewing and data collection.
c) Approximately six years of experience on a college campus supporting, interviewing, and training research faculty in both individual and group sessions.
d) Extensive participation in faculty governance structures over a five year period.
e) Graduate coursework and applied fieldwork in qualitative interviewing techniques.

Appendix B: Case Study Selection Rubric

This study sought to explore the motivational attitudes of faculty members working on a research-intensive campus who have exhibited a great willingness to invest in their undergraduate teaching activities as represented by their use of instructional technologies in creative and advanced ways. As this study has a particular focus on intrinsically-motivated faculty members, it will be important to ensure that the use of these instructional technologies is not directly related to their scholarly research or publishing activities. Thus, I selected the case participants with this criterion in mind.

Within this basic framework, additional exploration into the influences of certain demographic characteristics on their intrinsic motivation is desired. Thus, the selection of participant faculty members included both genders as well as variety in age, academic departments, and professional attainment (pre- and post-tenure). Specifically, I sought to include a total of four (4) individual cases in this study that attempt to cover the following categories:

(a) two male, two female, (b) four distinct academic areas, (c) two early career, two late career, and (d) representation from both pre- and post-tenured ranks.

To validate the appropriateness of the selected faculty participants, I used triangulation through the assistance of both sociological researchers with qualitative case-study experiences as well as professional colleagues who assisted in selecting faculty participants whose level of investment in teaching and technology met the study goals. The following paragraphs and exhibits provide a detailed review of the entire case selection process that I employed.

An initial invitation was sent to 12 potential candidates via email and all 12 of them responded affirmatively. They were then asked to complete and submit a self-assessment instrument (see "Figure B2" below) that I had designed to help in verifying and ranking their suitability for inclusion in the study.

An additional peer-assessment (see "Figures B2 and B3" below) of these same 12 potential participants was completed by four (4) professional colleagues in the Advanced Learning Center. These colleagues had the benefit of similar interactions with these faculty members. The purpose in this parallel peer-assessment was for the purposes of triangulation and overall study rigor. It also offered the additional benefit of potentially compensating for researcher subjectivities the critical step of participant inclusion.

Late in the process, four of the original twelve candidates were rejected based on exclusionary study factors such as a lack of undergraduate teaching or that their research activity included a focus on teaching or instructional technologies. As a result, the pool of 12 initial candidates was pared down to eight (8) that still met the overall criteria.

The final selection of four (4) candidates in the study was completed using a combination of all of the above tools and methods (See: Figure B4 "Final Summary Rating of Faculty Finalists"). While this overall process still left some ambiguity about whether I selected the most appropriate case studies out of the original 12, it did leave me feeling highly confident regarding the appropriateness of the final four participants as supporting the study's original design and goals. The tables below ("Summary of Selected Case Participants by Study Factors" and "Summary of Case Selection Process") provide a recap of the overall process I employed to select the four case participants used

in this study and a summary characteristics of those individuals relative to the study factors and questions.

Summary of Case Selection Process

	Pool of Potential Participants	Process	Results
1	**800+ FT Faculty on UoM campus**	Personal knowledge of Researcher	Twelve (12) potential candidates identified and contacted
2	Twelve (12) identified potential participants	1. Self-assessment instrument 2. ALC peer-review assessment	All twelve remained in pool
3	Twelve (12) candidates from original selection	Re-evaluation by researcher: 1. Rejections as appropriate 2. Overall rating and ranking using scores from step 2 above	Eight (8) finalists identified
4	Eight (8) finalists	Final selection of study participants by researcher: 1. Consideration of study questions and factors 2. Supported by overall rankings from previous steps	**Four (4) case study participants**

Summary of Selected Case Participants by Study Factors

Factor	Case 1	Case 2	Case 3	Case 4
Academic Department	Marketing	Engineering	English	Economics
Career-Level	Pre-Tenure	Post-Tenure (<1 yr)	Post-Tenure (<5 yrs)	Post-Tenure (25+ yrs)
Age	<40	<40	40-60	60+
Gender	M	F	F	M

Figure B1: Self-Evaluation Survey Instrument (Completed by 12 potential participants)

Faculty survey for potential participants:

Faculty Name: _____

Date Completed: _____

1. Do you use an online space (D2L, UMDrive, etc.) as a significant part of your teaching activities in a majority of the undergraduate classes you teach in any given semester? YES NO
2. Which of the following online teaching technologies/tools do you use in any given semester? (Select all that you use):

Check (☑)	
	UMDrive for content distribution
	Syllabus & lesson content in UMdrive or eCourseware
	Gradebook in eCourseware
	Dropbox utility in eCourseware
	Blogs
	Podcasting
	Internet Audio-conferencing (e.g., Wimba)
	Wiki technology
	Student clickers
	Social networking tools (e.g., Zoho)

3. How many years have you taught at the University of Memphis? _____
4. Of those years, starting in the current year and looking back, for how many years have you been using online resources (WebCT, Blackboard, D2L/eCourseware, UMDrive, Website, other) as a significant part of your undergraduate teaching work? _____ years
5. Have you ever submitted a TAF Innovation Grant proposal for consideration by the ALC (SI/ST, IEL, I2, Technology Fellowship Program, etc.)?
   If YES, then how many times have you submitted a TAF grant? (Note: You do not need to have been awarded a grant; only submitted a grant for consideration.)

6. When considering why you choose to use various technology tools and techniques in your teaching which of the following positively influence your activities? (Check all that apply)

Check (☑)	
	The intellectual challenge of pursuing new pedagogical techniques
	The opportunity to explore new uses of technology in general
	Greater flexibility in the use of time
	Reaching new populations of students and overcoming barriers to their educational opportunities
	Improved learning outcomes for students
	Personal fulfillment
	Opportunity to develop new ideas (general intellectual curiosity)

7. Is the use of instructional technologies in your teaching activities directly related to your primary area of scholarly research and publication?

Figure B2: External Evaluation: Completed by ALC Professionals

ALC Rating Survey of Potential Participants:

Date: Monday, October 27, 2008

To: ALC professional staff

From: Sandy Schaeffer

Re: Selection of faculty participants for dissertation study on faculty

I am seeking to select four faculty from our campus as case-studies for use in my dissertation research on faculty motivation with respect to using technology in their teaching activities. I need your help rating the faculty below as potential participants in my study group. Please rate each of them using the guidelines below and return to my mailbox by Friday, October 31st. I have provided an envelope for you to use to return your responses which will be kept confidential and used only for the purposes of this study.

Your name: Date:

Question: When you think of (Faculty member "X"), how would you rate his or her level of innovation, aptitude, and relative effort with instructional technologies in their teaching activities when compared to other faculty on our campus? (Check the most appropriate description in your mind for each of the faculty members listed in the table below.)

Choices:

Check	
	Below average
	Average
	Exceptional
	N/A = No Opintion

Faculty list to be considered:

	Name	**Academic Unit**	**Below Avg**	**Average**	**Above Avg**	**N/A**
1	Case A	FCBE, Mgmt				
2	Case B	English				
3	Case C	FCBE, MIS				
4	Case D	Biology				
5	Case E	Mech. Engineering				
6	Case F	Biomed. Engineering				
7	Case G	Nursing				
8	Case H	Computer Sci.				
9	Case I	FCBE, Mktg				
10	Case J	History				
11	Case K	Sociology				
12	Case L	Economics				

Figure B3: Summary of ALC Ratings of Potential Faculty Participants

		ALC#1	ALC2	ALC3	ALC4		Avg	Self-Score
1	Case 1 (selected)	2.5	2.0	3.0	3.0		2.6	17
2	Case 2 (selected)	2.5	3.0	3.0			2.8	19
3	Case 3	2.5	3.0	3.0	2.0		2.6	13
4	Case 4	2.0	2.0	3.0	3.0		2.5	17
5	Case 5		1.0	3.0			2.0	9
6	Case 6 (selected)	1.5	2.0	2.0	1.0		1.6	17
7	Case 7 (selected)	3.0	2.0	3.0	3.0		2.8	12
8	Case 8	2.0	2.0	3.0			2.3	9

Appendix B4: Final Summary Rating of Faculty Finalists

Participant Selection Scoring (Oct 2008)								
	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6	Case 7	Case 8
Question								
Use O/L in UG	1	1	1	1		1	0	0
# Tech Tools Used	6	6	6	3	2	2	5	1
# Yrs using O/L	5	5	2	5	2	5	2	5
# TAFs submitted	1	2	0	2	1	3	2	0
# Intrinsic factors	4	5	4	6	3	6	3	3
Total Score	17	19	13	17	8	17	12	9
ALC perception score (1-3)	2.6	2.8	2.6	2.5	2.0	1.6	2.8	2.3
Non-scored factors								
# yrs at UoM	8	7	5	16	2	33	2	18
Tech related to research?	N	N	N	N	N	N	N	N
Tenure Status								
Pre			X		X		X	
Post	X	X		X		X		X
Age								
<40					X		X	
40-60	X	X	X	X				
>60						X		X
Gender								
Female	X	X	X					
Male				X	X	X	X	X
Selected in Study	X	X				X	X	

Appendix C: Data Source 1–Interview Data

While many types of data were collected throughout the course of the case study, one of the most important forms was the direct interview with the individual faculty. The purpose of these initial interviews was to explore the motivational attitudes of the case participants and to expose other avenues of research to pursue that are consistent with the primary research questions of the study. Therefore, it was important to ensure that the initial interview opportunities provided ample opportunity for open-ended dialog on the part of the participant while remaining anchored to the core purpose of the research and its questions.

Interviews with four case-study participants

There were three (3) recorded interviews with each of the four case participants, each of which is expanded upon below. This generated a total of 12 sets of recorded interviews of approximately 30 minutes each or roughly six (6) hours of transcribed interview data. All of these interviews were conducted using a predefined script prepared the by researcher. Each script had a specific purpose based on a combination of the study questions and analysis of previous interviews. Examples of interview scripts can be found in the figures (C1, C2, and C3.) All of these interviews were conducted over a period of approximately seven months that spanned two academic semesters. All were conducted in a natural setting chosen by the participant. In most cases this was their private office on campus or in a teaching space nearby.

Interview #1: (Baseline Interview with participant)

Purpose: A series of questions designed to probe the attitudes and experiences of the candidates with respect to technology and teaching and to give the researcher a broad set of baseline data for subsequent interviews. The primary goal of this interview was to generate data and provide direction for additional data collection later in the study.

Design: Open-ended questions designed to solicit rich data from the participant ("Describe a time that you experienced…", "How did that impact you?", etc.)

Processing: All interviews were transcribed into digital format. The initial analysis included researcher and summary notes, baseline coding, and development of potential themes. Output of this interview provided direction for follow-up interview scripts and other data collection efforts.

Interview #2: (Motivational Context)

Purpose: To probe the general motivational context of each candidate based on a study instrument used in previous studies for white-collar workers from other industries (e.g., engineering). Attempt to validate efficacy of a survey instrument used to study other professions for the study of higher education faculty. Complemented and expanded on what was gained from the Interview #1 without significant overlap or redundancy.

Design: Modified version of survey instrument developed by Herzberg (1959) in initial studies of worker motivation.

Processing: All interviews were transcribed into digital format. This was followed by additional analysis in the form of researcher field notes, additional coding and theme development that resulted in both new results and further exploration and confirmation of results derived from the initial interview. Output of this interview analysis provided additional design for third interview script.

Interview #3: (Refinement and Member-Checks)

Purpose: The goal of this interview was for refinement and confirmation of codes and themes that emerged from first two interviews. That is: to strengthen overall study rigor through data-exhaustion, triangulation, and member-checking.

Design: Each participant was interviewed using a unique script that was developed using a combination of customized questions drawn from analysis of first two interviews. This interview also included a rating/ranking question (see Figure C3 below) which was designed to help look for common themes across all four case participants.

Processing: All interviews were transcribed into digital format. Parsing and analysis used results from code and theme development. This included additional researcher field notes as well as generation of initial sets of cross-interview code tables and supporting quotes. This analysis resulted in

initial development of potential themes specific to each candidate and for the study group as a whole. Results of this analysis were used as input for follow-up data collection efforts including classroom observations and department/program chair interviews.

Interviews with Department/Program Chairs

In addition to the three interviews with the individual participants, there was one interview with the department/program chair of each participant. This interview was conducted separately and after the initial three participant interviews had been completed. The interview script used with the chairs can be found in Figure C4 below.

Interview with Department Chair: (Departmental Culture and Triangulation)

Purpose: Develop perspectives on departmental culture with respect to potential influence on faculty rewards, tenure and promotion, and other external factors of investment by individual faculty into their teaching activities. Special emphasis was placed on the exploration of how effort related to using technology could affect professional perception and advancement of faculty in their respective areas.

Design: These interview scripts had a common structure and used questions defined by the researcher specific to the purpose of the interview. The interviews were conducted "blind" of the case study participant in which the interviewee was informed clearly of the nature and structure of the study but the name of the specific case study participant from their department was purposefully withheld. (It is worth noting that during the interview all but one the four chairs correctly identified the case study participant as the 'technology leader' in their unit.) The result of this "blind" design feature was helpful for overall study rigor in the form of confirmation of previous results (e.g., triangulation) as well as the

generation of new insights central to the study beyond what came from the participant interviews (e.g., additional data case-study exhaustion). This interview was also critical to the exploration of the study questions of departmental culture and career balance.

Processing: All department chair interviews were transcribed into digital format. Coding and analysis followed similar patterns and techniques to previous interviews. These interviews were very helpful in understanding the departmental culture question. They also shed light on the participant's motivation not just as a solo individual within the entire campus population, but also within a peer group at an academic unit. The chair interviews also helped expose a new theme related to the influence of campus leadership on departmental culture and teaching.

Figure C1: Baseline Interview (Participant)

Participant: _____

Date: _____ Time: _____

Location: _____

Description of Environment:

Interview Questions:

Q1 Tell me about a time you felt motivated to change or innovate in the way you teach through the use of technology. What factors influenced your motivation?

Q2 To what extent do instructional technologies influence the way in which you feel motivated to change how you teach?

Q3 In considering your fellow faculty members, what motivational factors do you believe influence how they innovate in teaching?

Q4 Describe how you believe the university's administration influences your effort in using technology in your teaching?

Q5 Describe how you believe your departmental culture influences your effort in using technology in your teaching?

Q6 What motivates you most about your work at [the university]?

Figure C2: Herzberg Questions (Participant)

Participant: _____

Date: _____ Time: _____

Location: _____

Description of Environment:

Job Attitude Questions:

Think of a time when you felt exceptionally good or exceptionally bad about your job at the university. Describe what happened?

Q1 How long ago did this happen?

Q2 Can you tell me more precisely why you felt the way you did at the time?

Q3 What did these events mean to you?

Q4 Did these feelings affect the way you did your job? How? How long did this go on?

Q5 Can you give me a specific example of the way in which your performance on the job was affected? How long?

Q6 Did what happened basically affect the way you felt about working at the university or did it merely make you feel good or bad about the occurrence itself? If so, then how?

Q7 Did the consequence of what happened affect your career? If so, then how?

Q8 Did what happened change the way you felt about your professional work as a faculty member? If so, then how?

Q9 How seriously were your feelings (good or bad) about your job affected by what happened? Pick a spot on the line below to indicate how strong you think the good or bad feelings were. Circle that position on the line. (See page #2 for the participant to complete)

Q10: Is there anything else you would like to say about the sequence of events you just described?

Figure C3: Prioritization and Member-Check (Participant)

Objective in this interview is to probe:

Excitement, competition, "new" v. "old" and different

Value of "recognition"

Q1: Considering your approach towards teaching innovation, think about the following pairs of words and describe your thoughts:

Old	vs	New
Equilibrium	vs	Discontinuity
Collegiality	vs	Competition
Practical	vs	Fun
Silence	vs	Buzz

Q2: Rank the following words and phrases from most important to least important when thinking about how you approach your use of technology tools in teaching:

- Increased Productivity
- Personal Fulfillment
- Student Benefits
- Fun
- More Orderly

Q2b: Discuss why you ranked them as you did.

Q3: Last time we chatted, you mentioned the value of recognition in consideration of your efforts with teaching innovation. Please elaborate on the significance of recognition as a motivator in how you approach teaching activities.

Q3b: Can you describe a time in which you were disappointed as a result of not being recognized for an unusual teaching effort?

Q4: May I interview your department chair about his/her perceptions on teaching innovation & technology? If yes, their name:

_____

Figure C4: Department Chair Interview

Participant: _____

Date: _____ Time: _____

Location: _____

Description of Environment:

Interview Questions:

Q1 How would you describe your personal attitude about the relative importance of teaching effort here in your department at the university?

Q2 How would you describe the culture of the university with respect to teaching innovation or the use of technology in teaching? How has that influenced your leadership activities within your department?

Q3 How would you describe the culture of your department regarding teaching innovation and teaching with technology (online, etc.)?

Q4 Can you recall a time in which your leadership role in your department might have influenced the perception or behavior of faculty within your area regarding the use of technology in teaching? If so, then could you please describe that experience?

Q5 Can you think of a faculty member in your area that stands out as being more innovative or advanced with technology in their teaching? If so, please describe why. How has this impacted their professional advancement within their department at the university?

Appendix D: Classroom Observations

The following material provides an analytical discussion of how I approached the collection of classroom observation data with each of the four case participants. This is followed by two figures (D1 and D2) that provide examples of data collection instruments that I employed as part of these classroom observations.

Data Source #3: (Classroom Observations)

Purpose: Direct observation of classroom instruction was an important component of the overall data collection process for all four participants. The general purpose of these observations was for overall study rigor in the form of additional depth and breadth of data collection, but more specifically to provide additional insights into how the expressed motivational behaviors of the participants manifest themselves in a live classroom setting. In more simple terms, I wanted to compare what these faculty members practiced with what they preached.

Design: Three (3) classroom observations were conducted over the course of two academic semesters. For each participant, one occurred in the Spring semester of 2009 and two were conducted in the Fall semester of 2009. (Note that in the case of one participant, their fall schedule only contained online undergraduate sections so the observation methodology in that case had to be modified to accommodate that situation for the last two collection events.) The specific method of collecting data from the classroom observations included a combination of techniques drawn from

previous formal classroom experience, committee recommendations, material drawn from the literature, and researcher intuition. In the first classroom data collection event, I used a field observation technique drawn from my formal qualitative methods classes. This involved a very detailed journal of observed activities and events throughout the class period. I kept very detailed descriptions of things I observed in a predefined journal format that included a time-stamp and activity-code, and short description of what I observed. This technique could help me later essentially reconstruct the experience of the entire class using the details I had captured. It required little thinking or "meta-analysis" on my part during the course of class with the assumption that analysis would take place at a later time.

By the time I came back to conduct the last two classroom data events, I had already completed a substantial amount of analysis of all of the previously-collected interview data and first classroom observation. At this point, I was less concerned about collecting significant new themes, but more concerned with additional depth to my understanding of previously-derived results. Additionally, I wanted to explore alternate methods of classroom observation techniques for the benefit of future studies of a similar nature. To achieve these goals in the last two classroom observation activities, I used a combination of two techniques: (1) the SOM (School Observation Measure) as adapted from Ross et al

(2004) - which is broadly used in studies of K-12 environments - and (2) my personal skills as a more experienced field researcher through integration of what I observed during the class within the context of my previous experiences and analysis of these four participants. In other words, by this stage, I had the benefit of having studied these four participants at a very extensive level and used the classroom observation opportunity to triangulate or clarify results already derived from the study. I used the SOM component largely "as is" but extended it slightly to include additional data on observed use of technology. I collected SOM in two general forms: (1) a self-evaluation as provided by each of the four participants and (2) an external evaluation conducted by the researcher during each of the last two classroom observation experiences. For each of these last two classroom observation events I kept extensive hand-written field notes in a general format.

Processing: Understanding how to best approach the analysis of these classroom observations was challenging for me as a researcher because of my relative inexperience in formal, standardized approaches for analyzing this type of data. It was further complicated by the wide variety of data I had collected (detailed activity journals, SOM evaluations, and field notes). Ultimately, what made most sense to me was to treat the observational data less as a source of original codes and themes, but instead as an effective source of member-checking, triangulation, and the overall richness and depth of the data collected for each participant. This approach

worked well. By the time I reached the last classroom observation rounds I had completed almost a year of total data collection and analysis for all four candidates and, as a result had developed a relatively strong understanding of them as individuals within the context of the study's goals and questions. By benefit of my previous analysis I had already developed a strong mental picture of each participant that included representative words, actions, and behavior patterns that I was able to readily observe in their classroom techniques. Thus, these latter classroom observations were very effective in strengthening my confidence in the study results to be reported.

Figure D1: Classroom Observation (Event Log Model)

Observation Name: _____

Date/Time: _____ Participant: _____

Location: _____

Description of Location:

Things to observe:

EVNT	Events	
BHV	How people behaved	
RCT	How people reacted	
CONV	Conversations	
POST	Positioning (faculty & students)	
CMGO	Comings & Goings	
PGST	Physical Gestures	

Observation Journal Date/Time:
Participant:

	Time	Code	Notes
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			

Figure D2: SOM Assessment Model (Ross et al.)
Used for self-assessment and by researcher during observations

	Never	Rarely	Occasionally	Frequently	Extensively
Instructional Orientation:					
Direct instruction (lecture)					
Team teaching					
Cooperative/collaborative learning					
Individual tutoring (instructor, aid, peer)					
Classroom Organization:					
Groups based on ability					
Groups / teams on projects					
Instructional Strategies:					
Project-based learning					
In-class challenge question strategies					
Acting as a coach/facilitator					
Student Activities:					
Independent (self-paced in class, home work)					
Experiential / hands-on learning					
Systematic individual instruction (differential assignments based on individual needs)					
Sustained reading					
Independent (self-paced in class, home work)					
Independent inquiry / research by student					
Student discussion (in-class)					
Technology Use:					
Computer / Internet for instruction in class					
Internet for research					
Online Learning (eCourseware)					
Online quiz / test (non-graded)					
Assessment:					
In-class assessment exercises					

Student self-assessment (portfolios, homework, etc.)					
Online quiz / test (graded)					
Homework submitted for assessment					

Appendix E: Top Intrinsic and Extrinsic Motivators / Demotivators

Table E1: List of top intrinsic motivations reported by faculty
The intellectual challenge of pursuing new pedagogical techniques
The opportunity to explore new uses of technology in general
Greater flexibility in the use of time
Reaching new populations of students and overcoming barriers to their educational opportunities
Improved learning outcomes for students
Personal fulfillment
Opportunity to develop new ideas (general intellectual curiosity)

Table E2: List of top extrinsic de-motivations reported by faculty
Do not feel that the campus values the extra effort required
Inadequate compensation for time and other resources required to make the instructional changes
Pre-tenure or younger faculty perceived that research and publication was a more valuable investment of time for their careers
Lack of professional recognition in general
Lack of institutional support in the form of resources (materials, grants, external labor, etc.)

Appendix F: Time-Line for Study

Milestone Activity	When
Submit IRB	September, 2008
Selection of faculty case study participants	September/October, 2008
IRB approval	October, 2008
Data collection	October, 2008–October, 2009
Data analysis	January, 2009–December, 2009
Identify and initial findings	Spring/Summer 2009
Periodic peer debriefings and member checks	Spring/Fall 2009
Detailed analysis & theme development	Fall 2009
Finalize, submit and defend dissertation	Spring 2010

Appendix G: Personal Subjectivity Statement of Researcher

As I consider my personal subjectivities and how they may relate to the exploration of faculty motivation and technology, it has become evident to me that my professional life is essentially infused with the topic of my study. The observation by Jansen and Peshkin (1992) that qualitative researchers are in many ways studying themselves resonates greatly with me.

In grappling with this issue, I jotted down the many ways that aspects of my professional life overlap with my study area. As this list grew, a picture emerged that told me that I do not have an "arms length" relationship with my topic of study or the participants that will likely be my sources of data. Any discussion of my personal relationship to the subject matter of my research is, for all practical purposes, a discussion of my emotional and intellectual engagement in what I do at the university where the study will be conducted. In keeping with common practices of representation in qualitative research, I have concluded that an effective way to expose my subjectivities is in the form a personal story of my professional role as the director of our campus' faculty support center for teaching and learning with technology.

The story below is a hypothetical 12 hour period of my professional life and was assembled using real events and experiences that actually occurred on different days over a short matter of weeks. However, they could have just as easily all taken place in exactly this sequence on a single day.

8:00AM

My day starts at 8AM. After scanning through my email and deleting the accumulated junk from the overnight spammers, I focused in on the five or six important

emails from faculty regarding various support issues using the new course management system that we have implemented in recent months on our campus. As the director of our campus teaching and learning center, it is my job to ensure that the faculty needs are met regarding any facet of their use of technology in teaching. While I try to stay at a high level of involvement in faculty needs overall, I also look carefully for details that expose issues that are unusual or concerning. In general I try to stay out of the way of the instructional technology specialists in our center, but zero-in when necessary.

Today's email queue is typical. Most of the faculty issues are repeats of common problems which I am able to review quickly. Over the last six years, I have become relatively adept at scanning large numbers of email and quickly focusing on the ones that merit my scrutiny. Among those that catch my attention, I always look carefully for those from certain departments that are most dependent on the technologies and services we provide. One such area is our college of nursing. From years of working with our nursing faculty I have come to know that they are intense and creative users of online teaching technologies. As a result, their program has become highly dependent on an efficient and effective operational environment with our course management system. Everyone in the center where I work is highly familiar with many of the nursing faculty members and is aware of the high level of service level expected by the nursing department. If anything hiccups, I will usually get a call directly from the nursing dean. Fortunately, today there are no outstanding nursing issues. In fact, I am pleased to discover that this is a quiet day. There is no evidence of faculty who have complained to the chief information officer or school president about something that has not worked right in their online teaching. By 8:30AM things look good.

Glancing at my calendar I see the 9AM meeting I have with Bob, a faculty member over in the business school. Today's meeting is important regarding his recent appointment to a fellowship program through our teaching center. The fellowship program to which he has been appointed to is a competitive one that identifies and rewards exceptionally innovative teaching faculty. He has called me to discuss and resolve a number of compensation and classroom equipment issues through his fellowship appointment. I have been putting this meeting off for weeks, but I know we need to meet face-to-face in order to sort through the backlog of mechanical tasks so we can have the freedom to move forward with the teaching innovation project we are helping him launch.

Bob has been with the university for almost three years and during that time, he has exhibited exceptional levels of commitment to his students, to effective teaching and learning activities, and to the creative and innovative use of technology in his instructional activities. We see him as a shining star.

Bob and I meet in an on-campus restaurant and talk for an hour. I am glad when we get to the end of the operational and paperwork issues so we can get to the fun part of our meeting. Today I have asked him to do a walk-through of the new classroom configuration we have funded. He has gutted a classroom and reconfigured it for student collaboration using a combination of laptop computers, wireless projector systems, and collaboration software. Not only is it technically progressive, he has also based this experiment on sound pedagogical theory and contemporary "best practices" for student engagement. In fact, one of the instructional design professionals in our center will be working with Bob on a research project to evaluate the learning outcomes of his new

classroom model. They plan to co-author and submit for publication a paper on this initiative. We finish our meeting by mid-morning.

As I am walking back to my office, my mind wanders to my research prospectus. I reflect on my meeting with Bob and I think about how his various teaching initiatives could be a perfect case study for dissertation. Not only does he exhibit the right attitude and behavior with regard to instructional technologies, but these teaching innovations are largely unrelated to his research area in business. I am looking for faculty members who exhibit a high level of intrinsic motivation to innovate with technology and Bob seems to fit the mold. At the same time I begin to consider the possibility that I know Bob too well. Are we too close as friends and professional associates for me to use him in my research? How would our existing relationship potentially detract from the value of the study if I were to select Bob as the case participant?

As I wrestle with this question, I think back 25 years ago in my prior work as a research biologist. Back then, I do not recall getting too close to the bacteria or lab mice that were the 'participants' in my research. Nor did I worry about how close I was to the canisters of reagents on the laboratory countertop. Perhaps as a fellow human being, the social scientist has a certain unavoidable subjectivity with his or her human participants. Regarding Bob, I decide to park this internal conflict for later resolution.

By now, I'm back in our offices. With the morning largely consumed, I use the sliver of time leading up to lunch for casual conversation with the professional team in my group. We chat mostly about faculty issues ranging from the minor and mechanical to the more obscure and difficult. Ultimately, the conversation circles around, as it frequently does, to stories of the most challenging faculty on campus. "Can you believe

that Dr. Smith still didn't know what a browser is even though he's been using Internet Explorer and teaching online for five years?" "Wow. I just spent three hours with one faculty member on how to load a syllabus into her online course and that was after covering the same thing last week in two training sessions. I swear she can't learn this stuff."

I have to resist the temptation to be very irritated with the faculty members we discuss in this way. Not only do they consume a great deal of our center's time and energy, they are often also the loudest and most frequent complainers about the pressure to change the way they teach. We speculate that, given the choice, these faculty members would rather be standing at a lectern in a class or writing up their next research publication - not learning how to improve and innovate in the classroom and master new technical skills.

What I have come to realize is that I naturally gravitate to those faculty members who overtly embrace the teaching mission of our institution and those who invest significant time finding ways to innovate with the many new tools that are available on our campus. They are not the luddites who represent a source of frustration and disappointment to me. I have both "fun" and "work" facets to my job and the behavior and attitude of these two faculty subgroups largely define the border between these competing sides of my work. But, as my job is to assist all the faculty members on our campus, I am compelled to get past this internal division and remind the team to treat them all equally.

After lunch, I have an unscheduled meeting with the most senior professional on my team. Sarah and I need to discuss a variety of changes to our calendar of faculty

training sessions. The changes are driven via feedback from a recent faculty senate survey on our new online course management technology. During this conversation, we work around to my dissertation effort, which is a topic she and I have discussed on multiple occasions. I tell her about my current work writing the methodology section and my anticipated use of case-study data collection and analysis. We chat about epistemologies, ontology, and personal subjectivity statements. As we drift further into the topic of qualitative research, she shares with me her anxieties about interviewing. I brag a bit about interviewing being the least of my worries given all the years I spent in the software industry in sales and high-end consulting and how that experience prepared me well for the mechanics of sociological data gathering. Because of this experience, I am highly relaxed in a participant interview and feel quite natural at questioning, listening, and analyzing in concurrent mode. I tell her about my 18 months of formal training I received as an employee of IBM including extensive development of interviewing skills. My colleague points out to me that this 'strength' may in fact be a weakness. Am I too comfortable and relaxed as an interviewer? Do my strong interviewing skills create a dominance factor with my participants that damage the authenticity of the data I collect from them? Am I in selling mode instead of listening mode? Hearing her words elicits within me an anxiety about this part of my research. I conclude that this is an issue for me to address in my personal subjectivity statement within the methods chapter of my research prospectus.

The bulk of my afternoon is spent in a lengthy project management meeting with the Information Technology Division during which we discuss, among other things, technical issues related to the new course management system as well as a new

podcasting system that is being made available to the campus. I close the day at my desk by making a few notes on thoughts from the day's activities and highlighting important tasks to pursue tomorrow morning.

Appendix H: Summary of Technologies Used in Data Collection and Analysis

Technology	Use
Sony ICD-P620 Digital Audio Recorder	Audio-recording of interviews with case-study participants, including department chairs. Also supports industry-standard MP3 format.
Microsoft Office (Word & Excel)	Word: Transcription and storage of recorded audio-files. Excel: Used in developing data matrices and tables of parsed data as recommended by Yin and Boyatzis.
Ethnograph v6.0 (Qualis Research) URL: http://www.qualisresearch.com/	Used in direct coding of raw interview data and flagging of key quotes for evidence representation. Assisted in overall organization of interview analysis.

Appendix I: Theme and Code Analysis Results

This section of the report provides a summary of the results analysis in the form of themes that were reported and their associated codes. Following summary table I.1 below is a expanded representation of each theme and its associated codes using the coding format as recommended by Boyatzis (1998). Specific examples of coded data are also included with each theme/code summary.

Themes that exhibited a positive influence			Code(s)
1	Intellectual Curiosity	The case participant pursues technology innovation based on personal intellectual curiosity	Personal Needs - Interest/Curiosity - Personal-Fulfillment
2	Competition / Differentiation	Innovation with technology fulfills a personal need to differentiate or compete professionally	Personal-Needs - Competition - Differentiation,
3	Student Feedback Loop	Reaction by the students to the introduction of technology provides a positive reinforcement	Student Feedback - Pedagogy - Student Benefits - Student Reaction
4	Networking with Colleagues	Opportunities to be exposed to new ideas through colleague interaction increases levels of innovation	Networking - Events - Peers
5	Campus Administration (Resources)	Resources (technology, training, support) provided by the campus support innovative behavior	Campus - Campus-Resources
6	Money (Indirect)	Departmental tuition and fee income derived from new online programs functions as a positive motivator	Campus - Campus-Resources Department - Dept-Resources
7	Previous Exposure	Previous exposure to technology in graduate school or early career reduces barriers to innovation	Past-Exposure - Grad-School - Previous-Use
8	Persistent Personality	A persistent attitude of pushing through challenges by the case participant supports their ability to continually innovate	Persistence - Skills - Tech

Themes that exhibited no evidence of influence			
9	Departmental Culture (Lack of Impact)	There are conflicting perceptions of the campus culture regarding efforts with technology in teaching between the participant and their department chair. However, the campus culture does not appear to provide a direct impact on the behavior or attitude of the case participant.	Department - Dept-Culture
10	Campus Culture (Lack of Impact)	The campus culture regarding efforts with technology in teaching does not appear to affect behavior or attitude	Campus - Campus-Admin
11	Money as Compensation (Lack of Impact)	Money in the form of direct compensation to the case participant does not appear to alter attitude or behavior regarding efforts with technology	Money - Resources
12	Career Stage (Lack of Impact)	The career stage of the case participant (pre-tenure, post-tenure, late-career) does not appear to impact their level of technology innovation	Career-Stage - T&P
13	Research Expectations (Lack of Impact)	Research productivity expectations do not appear to reduce levels of technology investment	Research(?) - (No sub-codes)
14	Age (Lack of Impact)	Attitudes towards experimentation with technology do not appear to be strongly age-related	Age - (No sub-codes)

Exhibit I.1: Summary of Themes and Codes

Theme: Intellectual Curiosity

Label(s): PERSONAL-NEEDS (Parent-Group)
INTEREST-CURIOSITY, PERSONAL-FULFILLMENT (Child-Codes)

Definition: The case participant pursues technology innovation based on personal intellectual curiosity.

Indicators: [INTEREST-CURIOSITY] Description by the participant of a strong sense of intellectual curiosity about technology and where their personal experimentations with instructional technologies have helped fulfill that need. In particular, strong indicators are uses of variations of the word interest (interested, interesting, etc.)
[PERSONAL-FULFILLMENT] Description by the participant of some generalized sense of personal fulfillment that they achieve through their additional efforts experimenting with instructional technologies.

Differentiation: This theme was observed very strongly in two of the case-participants (both male) and to a lesser extent in one of the two female case-participants.

Examples of coded evidence

Williams	PERSONAL-FULFILLMENT I. And why? How did that help you professionally? Or why is that a goal you have? Again—to differentiate? B. I don't know—it's just…I guess it's an internal thing…Fundamentally I like the fact that there's different things to do every day. One day you're teaching. One day you're doing research…[I1: 123-127] One day you're doing training for industry…there's just such a wide variety…it's never – I never get bored with that I'm doing because there's always just so many different things. I like working [I1: 508-510]
Gootzeit	INTEREST-CURIOSITY The first time I saw them, I was very interested in them- personal computers- I'm talking about. [I1: 17-18] And I was using old-fashioned stuff so I thought it would be interesting to use more modern things and I was always interested in computers anyway. [I1: 13-15]

Theme:	Competition / Differentiation
Label(s):	PERSONAL-NEEDS (Parent-Group) COMPETITION, DIFFERENTIATION (Child-Codes)
Definition:	The Innovation with technology fulfills a personal need to differentiate or compete professionally (emotional benefit).
Indicators:	[COMPETITION] Description by the participant of their inherent competitive nature and instances where they have used extraordinary uses of technology to fulfill that need vis-à-vis their academic colleagues. [DIFFERENTIATION] Description by the participant of an internal desire to differentiate themselves professionally from their academic colleagues and where they have used their unusual skills with instructional technology to fulfill that internal desire.
Differentiation:	This theme was observed very strongly in one of the male case-participants (both male) and was not evident among the other three case-participants.

Examples of coded evidence

Williams	DIFFERENTIATION And so, that tells me what I'm doing is different. I'm differentiating myself from what the college is used to or this department is used to. [I1: 118-120] COMPETITION You have the idea there's always somebody out there that's practicing harder than you are. Who puts more hours at the gym. Well—I want to be that guy. [I1: 543-546]

Theme:	Student Feedback Loop
Label(s):	STUDENT-FEEDBACK (Parent-Group) PEDAGOGY, STUDENT-BENEFITS, STUDENT-REACTION (Child-Codes)
Definition:	Reaction by the students to the introduction of technology provides positive reinforcement to the case participant in their use of technology.
Indicators:	[PEDAGOGY] Description by the participant of applying techniques and technology with specific pedagogical purposes. [STUDENT-BENEFITS] Description by the participant of examples where teaching innovation activities (with or without) technology result in benefits to the students. [STUDENT-REACTION] Description by the participant of positive (or negative) student reaction to technology innovations.
Differentiation:	This theme was observed very strongly among all four of the case participants.

Examples of coded evidence

Popham	STUDENT-REACTION So, when I went fully online- it was a lot of work, but it wasn't overwhelming. Then I realized that students actually like online courses too. I mean they'll register for online courses- my course enrollment is full 20 minutes after registration opens up or something like that. And other people are running around saying…trying to pay students to enroll in their courses kind of thing. [I1: 256-263]
Curry	STUDENT-BENEFIT I. So what has governed your decision to pull back on the investment in clickers? CS#2: More of "does it actually increase engagement…with the students? That's the kind of thing I felt…maybe this will make those students that are very passive in class engage more and become more of an active learner…they might actually sit and think about the problem if they know they have to put in the answer. [I3: 297-303]

Theme:	Networking with Colleagues
Label(s):	NETWORKING (Parent-Group) EVENTS, PEERS (Child-Codes)
Definition:	Opportunities to be exposed to new ideas through colleague interactions increases the level of innovation by the case participant.
Indicators:	[EVENTS] Description by the participant of their participation in organized events where technology in teaching was discussed. [PEERS] Description by the participant of informal interactions with other faculty members and technology integration ideas were shared.
Differentiation:	This theme was observed strongly among all four of the case participants.

Examples of coded evidence

Gootzeit	EVENTS That guy who came here. The one from Southwest? He had a long beard? That guy is an interesting guy. He should talk about this sort of thing here more. I'd like to see him come around and tell people more about it…And he was very interesting. I thought to myself—"If only I could do this myself! Without going crazy and spending hours and hours a day trying to figure out how to use RSS" - which I've done a little of it, but not compared to this guy. [I2: 485-492]
Popham	PEERS I. And so, how did you come to select a wiki versus anything else under the sun? P. I said something to somebody about…I wished that we had a place like a course blog instead of an individual blog. And they said "well you could use a wiki for that." Now there's an idea. [I1: 52-56]

Theme:	Campus Administration (Resources)
Label(s):	CAMPUS (Parent-Group) CAMPUS-RESOURCES (Child-Codes)
Definition:	Resources (technology, training, support) provided by the campus administration function to increase levels of technology activity by the case participants.
Indicators:	[CAMPUS-RESOURCES] Description by the participant where institutional resources provided by campus administration positively impacted their personal activity with technology in teaching.
Differentiation:	This theme was observed at varying levels among all four of the case participants.

Examples of coded evidence

Curry	CAMPUS-RESOURCES I: To what extent do you think the university's administration has any influence on how you choose to invest in technology innovation in your teaching? CS#2: From my perspective the influence they're had is, by creating the Advanced Learning Center and the services that you provide, show that they invest in incorporating technologies...That's my overall perception. I: OK so if you were on a campus that didn't have an Advanced Learning Center or if we got shut down and went away, what influence do you think that would have on your behavior? CS#2: I think it probably would decrease, could decrease my use of technology and the new technology. [I1: 391-402]
Williams	CAMPUS-RESOURCES I would say when Joanne and Corey came over to talk that was a positive. That stands out because…I think that's a recognition from my, for my goals in using technology in teaching in different ways. There was the ability to do different things and…stand out a little bit. A SIST grant- right. And we were working on that and Corey and I had talked about open education- sharing knowledge and all those different things...So that was nice, that was fantastic. [I2: 29-42]

Theme:	Money (Indirect)
Label(s):	CAMPUS (Parent-Group) CAMPUS-RESOURCES (Child-Codes) DEPARTMENT (Parent-Group) DEPT-RESOURCES (Child-Codes)
Definition:	Departmental tuition and fee
Indicators:	[CAMPUS-RESOURCES] Description of instances where resources provided by the campus administration function to increase levels of technology innovation. [DEPT-RESOURCES] Description of instances where resources provided by the department function to increase levels of technology innovation.
Differentiation:	This theme was observed at varying levels among all four of the case participants.

Examples of coded evidence

Popham	CAMPUS-RESOURCES I. To what extent are administrative and campus activities and cultures a factor in how you go about innovating? CS#4: Well, I would not have done as much as I've done without the ALC. And the technology grants and the TFP, and those kinds of programs were highly influential. Had those things not been there, I don't know that I would have [done] as much. [I1: 391-398]
Curry	DEPT-RESOURCES I think we have the luxury in engineering of being able to support several kinds of teaching styles. Some people can teach with more research in the laboratory—experience not as real first-timers, but for application of measurements and methods. Other people can teach more in a sense of working with a computer lab or work on a blackboard. But in all cases, they have to teach. Or, buy themselves…[I4: 29-35]

Theme:	Previous Exposure
Label(s):	PAST-EXPOSURE (Parent-Group) GRAD-SCHOOL, PREVIOUS-USE (Child-Codes)
Definition:	Previous exposure to technology in graduate school or earlier in work as a faculty member functions as a positive motivator and confidence builder.
Indicators:	[PAST-EXPOSURE] Description by the participant of past or long-term experiences in their current professional position as a faculty member using technology. [GRAD-SCHOOL] Description by the participant of using technology in teaching or research while they were graduate students.
Differentiation:	This theme was observed at varying levels among all four case participants. Two of the participants showed very strong evidence of graduate school evidence and all four showed some evidence of past exposure.

Examples of coded evidence

Popham	GRAD-SCHOOL When I was a graduate student we had a fairly strong computer lab in which we were allowed to teach in the computer labs and to do so. I taught web page-you know- writing for web pages back when HTML code was the way in which you did that…but there was a group of his grad students who taught in these computer labs and we would often just meet. We would be down in the computer labs working a lot of the times and someone would say like you did "oh you can use this tool and do this and this and that." So that is kind of how we did it. [I1: 132-142]
Williams	PREVIOUS-USE When I was at Wisconsin we were a laptop campus and that was 5 years ago. That was at the forefront. Every faculty had to …"Look you're moving your faculty online. These students need to be using these laptops...[I1: 305-309]

Theme:	Persistent Personality
Label(s):	PERSISTENCE (Parent-Group) SKILLS, TECH (Child-Codes)
Definition:	A persistent attitude of pushing through challenges by the case participant supports their ability to continually innovate.
Indicators:	[SKILLS] Description by the participant of specific effort to acquire or apply skills with technology to work through a challenging situation. [TECH] Use by the participant of identified technical terminology in standard conversation.
Differentiation:	This theme was observed at varying degrees by all four case participants.

Examples of coded evidence

Popham	SKILLS I. So, how did you go about learning how to use the campus wiki? CS#4: I just got on and figured it out and then…when…and created it, which was fairly easy to do… And I didn't realize that. I thought that they would just be public. So then I went in and populated it which took me about, I dunno- an hour or two. It didn't take me very long. And…so then it was done. [I1: 63-70]
Gootzeit	SKILLS Even if I had more failures, it wouldn't matter. I'd still keep trying. [I3: 301-301]
Popham	TECH This semester I added a wiki to my class. To the course. Last semester I used a Blog in which I posted to a blog and had students write comments to my blog. That was slightly, technologically that was kind of problematic. They had trouble finding my blog. I had to explain to them a couple of different times how to find it, how to bookmark it, how to use it- and this was in the eCourseware site. [I1: 3-8]

Theme:	Departmental Culture (Lack of Impact)
Label(s):	DEPARTMENT (Parent-Group) DEPT-CULTURE (Child-Codes)
Definition:	Neither the leadership or the culture of the department provide a tangible or directional impact on the motivation of the participant to use technology in the classroom.
Indicators:	[DEPT-CULTURE] Description of the culture of their department regarding teaching effort or use of technology.
Differentiation:	This theme was observed very strongly among all four of the case-participants and their department chairs.

Examples of coded evidence

Curry	DEPT-CULTURE I think you summarized the culture correctly. There's not an influence on how you teach. There is an influence of effective teaching. [I1: 367-372]
Williams	DEPT-CULTURE I: To what extend you believe your management departmental culture influences behavior and your investment in your teaching? CS#1: None…but these are the people that are telling me "You can't do online education. We don't care what you're doing with technology. That's not necessarily an important thing. "Well that's nice…" These are colleagues—they could care less. [I11: 409-421]

Theme:	Campus Culture (Conflicting Impact)
Label(s):	CAMPUS (Parent-Group) CAMPUS-ADMIN (Child-Codes)
Definition:	There are conflicting perceptions of the campus culture regarding efforts with technology in teaching between the participant and their department chair. However, the campus culture does not appear to provide a direct impact on the behavior or attitude of the case participant.
Indicators:	[CAMPUS-ADMIN] Description of their perception of the culture of their campus regarding teaching effort or use of technology.
Differentiation:	This theme was observed at varying levels by all four case participants and their department chairs.

Examples of coded evidence

Gootzeit (Chair)	CAMPUS-ADMIN My attitude towards administration is always kind of…I read once the way Russians look at government is like the weather. You go inside when it's wet, go outside when the sun's out and you deal whatever the government is doing… Outside forces that you just have to deal with…An unnecessary evil sometimes. So in terms of what the university…has done. I don't really know… But whether there was any unifying force from the Provost to improve teaching quality was beyond my account until this year. I'm not really sure. I am aware they are being more active in encouraging of the use of technology…creating grants. Also, trying to get professors to adopt new technology…I would say that my sense is they're much more proactive about technology innovation than teaching innovation per se. [I4: 87-110]
Popham (Chair)	CAMPUS-ADMIN I am impressed…so far with this university's interest in making technology available and—to the professoriate—and encouraging the integration of technology into the curriculum. I think that some of the efforts are…they're noticeable, they're visible things. Money is clearly being spent on these things. [I4: 71-76]

Theme:	Money as Compensation (Lack of Impact)
Label(s):	MONEY (Parent-Group) There were no child-codes for MONEY
Definition:	Money in the form of direct compensation to the case participant does not appear to alter attitude or behavior regarding efforts with technology.
Indicators:	[MONEY] Description of the topic of money in the form of personal compensation to them in return for professional activity as a faculty member.
Differentiation:	This theme was observed strongly among all four of the case-participants.

Examples of coded evidence

Curry	MONEY Well for me personally, sure, it's important, but as an engineer I feel fairly confident that if—OK my academic career didn't work out for whatever reason—I could go to work in industry. So financially, it's not that important to me…if financial security were important to me, I would have gone straight into industry. [I2: 112-129]
Popham	MONEY I'm all on the band wagon, especially if it's going to make money…for the department. [I1:288-290]

Theme:	Career Stage (Lack of Impact)
Label(s):	CAREER-STAGE (Parent-Group) T&P (Child-Codes)
Definition:	The career stage of the case participant (pre-tenure, post-tenure, late-career) does not appear to impact their level of technology innovation.
Indicators:	[T&P] Description of making decisions regarding uses of time to perform professionally relevant activities that could potentially influence tenure and promotion for them as individuals.
Differentiation:	This theme was observed at varying levels among all four of the case participants and their department chairs.

Examples of coded evidence

Gootzeit (Chair)	T&P I: How do you think their perceived innovation in his space might have affected them professionally in the department? If at all. Any kind of professional influence in their careers. DC: I'm not sure that anything impacts full professors? [I4: 253-257]
Curry	T&P I don't think it's changed much. Just because to stay productive, you have to keep doing the same things. Effective teaching, getting external funding, publishing. The only thing that…I don't think I've made a specific plan to change it, but I expect that my service could become a larger percentage of my job duties… I'm not sure I feel different about working here. For the same reasons as the prior question. Still have to keep doing these things to stay productive—effective teaching, external dollars, publishing, service. [I2: 70-77]

Theme:	Research Expectations
Label(s):	RESEARCH (Parent-Group) There were no child-codes for RESEARCH)
Definition:	Research productivity expectations for case participants do not appear to reduce levels of technology innovation.
Indicators:	[RESEARCH] Description of things related to their individual research activities.
Differentiation:	This theme was observed at varying levels among all four of the case participants.

Examples of coded evidence

Williams	RESEARCH Most things I do in the teaching environment I do on the other side. Whether it be through training or engagement. We've talked about that. What I do in the classroom has to transfer to something else. The old "2 for 1". If you do something new, you've got to get at least two things out of it. [I1: 234-238]
Curry	RESEARCH …they valued that teaching experience they valued the effective teaching part of it, so they didn't see that as a detriment to my research. So, the hard question for me to answer was…how does putting more effort into teaching effect research? That's a question I struggle with all the time. The balance of effective teaching effective research, meeting the goals. Does the direction I'm going meet the goals of the department? [I1: 457-461]

Theme:	Age
Label(s):	AGE (Parent-Group) There were no child-codes for AGE
Definition:	Attitudes towards experimentation with technology do not appear to be strongly age-related.
Indicators:	[AGE] Description of professional activities in some form of relationship to the age of the participant.
Differentiation:	Although it was evident among all four of the participants, it was difficult to observe directly among any of them. The strength of the reported lack of impact by age was most evident with the oldest participant (CS#3).

Examples of coded evidence

Curry	AGE I could also bring out the fact that I'm…except for our newest female faculty member…I'm the…I'm next to youngest…So if there's a correlation there, I don't know. [I1: 345-347]
Williams	AGE Giant of a man (aside…) He's known for his [industry experience] and for his online education. He's significantly older than I am…That what he's known for…He's trying something new. And so I don't think it's an age thing. [I1: 394-401]

Appendix J: Sample Data Analysis in Array Format

Data Summary Table

Case Study = CS#1				Q1		Q2	Q3			Q4	Q5	
				Intr vs. Ext		Balance	Demographics			Tenure	Department	
				37	21	5	0	5	0	1	10	15
Item	Intv	Lines	Data	Int	Ext		Gen	Age	Oth		Part	DC
1		16-28		x								
2	1	39-42	On effectiveness: Q:"…there's so many more tools that can do things so much more effectively. And to be an effective teacher, you've got to…find a way to harness those new powers - those new abilities to get the information to students."									
3	1	44-51	EB is bothered by traditional means and sees technology as a way to get students "…excited about what they're doing for it to stick."									
4	1	76-81	EB wants to be atypical through technology. Q: "I guess I don't want to be considered a typical professor…someone who wears a tweed jacket with leather elbow pads."	x								
5	1	81-81	According to EB, "…you have to be engaged with industry to be a good teacher."	x								
6	1	86-95	See good quote on engagement.		x							